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NEW YORK, MAY, 1884.

Principal Contents of this Number.

BULLION.

ONE of the most noted recent contributions to the ever increasing volume of financial literature is a series of articles prepared by Mr. I. W. SYLVESTER, of the United States Assay Office in this city, in which he presents arguments in favor of "bullion certificates."

According to his proposed system, gold and silver bars are to be deposited with the government, who will in return issue certificates to the depositors, which certificates are to be redeemable on demand, and legal tender, and thus will logically become the national currency. This, in brief, is Mr. SYLVESTER'S project, and it is presented with much cogency and force; so much so, in fact, that his articles on the subject have attracted considerable attention, and the views therein expressed have been received with favor by financial critics.

There is an austerity about the suggestion that shields it from attack on the ground of visionary speculation. The nation has been so deluged with wild and impracticable schemes tending, in the minds of their promoters, to simplify the great financial problems of the hour, that the severe simplicity of Mr. SYLVESTER'S theory is a positive relief; and if we may be pardoned the liberty, we might say with some truth that this unusual absence of radicalism has evoked greater encomium than the suggestion really merits. The issue of bullion certificates in the manner and for the purposes advocated by Mr. SYLVESTER is, to our way of thinking, open to serious objection.

Epitomized, the operation of the projected system of bullion certificates is as follows: The various assay offices and sub-treasuries throughout the country are to be empowered to receive on deposit from individuals, gold and silver bars, and in return are to issue certificates for the amount of bullion deposited. These certificates are to be payable in bullion to the bearer on demand, and will thus become mediums of exchange, or currency. Upon the bars the government is to stamp in legible characters, their weight, fineness and calculated value, supplemented by the impress of the American eagle as a governmental trade-mark. The bars are to be of various sizes to provide for denominational certification, and sufficient bullion will be converted into coin to serve for the redemption of certificates of small value. Gold in bars of standard fineness and above, are to be legal tender, and silver in similar bars legal tender at its market value. Presuming upon the recognized superior convenience and adaptability of notes over coin, Mr. SYLVESTER argues that in a short time these bullion certificates would become the national currency, the present coinage being discontinued save in such limited quantities as may be necessary to redeem the certificates of small value.

The arguments most favorable to the system are those in relation to the certificates for the deposit of gold bars

which are legal tender at their face value, but even here much objection may be justly interposed. The system does not demand the retirement of bank notes, but such an emergency is contemplated, and should it take place, the money of the country would be absolutely in the possession of the government; a small amount of coin, estimated at one-tenth the present coinage, alone remaining in circulation. It is open to question whether such an aggregation of wealth in the hands of the government would not be injudicious. Furthermore, should these certificates ultimately take the place of our present currency, the government would be deprived of the advantages of its credit and resources; advantages which every financial or mercantile house possesses to a greater or less extent. For every dollar issued in the form of bullion certificates, the national treasury must hold in custody one dollar in bullion; and while the absolute safety of this provision is beyond question, it is to be doubted if the supply of bullion would be adequate to insure a sufficient certification to meet the demands of trade. It is not generally claimed that the government should constantly hold in deposit sufficient gold and silver to redeem at sight every dollar that has been issued in the form of notes, any further than individuals should stand ready at any moment to liquidate their entire indebtedness. Sufficient only is required to insure the currency a par value, and provide for the sight redemption of such as may be presented. The credit of the country can sustain considerable over-certification in its present system of currency, and the amount will regulate itself, being governed by the relative value of gold and paper. So long as they are identical in value, the credit and resources of the country rectify the discrepancy between the actual money in the possession of the government and its outstanding notes. With bullion certificates in the form and manner proposed, such advantages could not be derived.

We will assume, however, that the government may be empowered to indulge in over-certification of bullion to the same extent as it may safely do at present in the issue of currency. In this event, there seems to be no reason why banks and individuals may not imitate the national example. These latter may also issue bullion certificates and likewise over-certify. A bank note is now worth its face value for the reason that it is endorsed by the government. But if the banks enter into competition with the treasury in the issue of bullion certificates, it seems difficult to prevent an over-certification by private individuals and corporations, which is far different in its effects from that based upon the credit of the nation, where bankruptcy is practically impossible. The failure of the Marine Bank and the disclosures of the peculiar methods of the firm of GRANT & WARD within the past few days are painful reminders of the difference between national and individual credit.

Strongly as these objections may apply in the issue of gold certificates of deposit, they are intensified when the same process is applied to silver, and new and graver obstacles arise. Mr. SYLVESTER'S project contemplates the establishment of gold in bars of standard fineness and above as legal tender, but his treatment of silver is not so sweeping nor explicit. Silver in similar bars is only to be made legal tender at its *market value*. In accordance with the system the Secretary of the Treasury is required to ascertain daily the relative value of gold and silver at the cities of New York, San Francisco, London and Paris, and, transmitting the average of the same to various centers, shall cause it to be prominently posted. The average value of silver during each year is to be the standard of operations for that next ensuing.

The evils of a bi-metallic monetary system are manifold, but that they are to be overcome by an entire subserviency of one metal to the other seems a most dangerous proposition. Better the disease than the remedy. Gold and silver are commodities, and subject to fluctuation in their values, both relative and intrinsic. The laws of supply and demand are as rigidly obeyed in the exchange of gold and silver as in that of any merchandise, but silver more especially varies in its value, and herein lies the trouble. Did the *relative* value of gold and silver remain constant, all objection to a bi-metallic standard would disappear, but its variance is the source of much complication and difficulty, in which silver as the baser metal suffers. In our opinion this difficulty can only be met in one of two ways: either retire silver as a standard and let gold alone circulate as actual money, or take no note of the variation in their relative value save at such rare intervals as when the disproportion becomes so great as manifestly to injure trade.

In the system advocated by Mr. SYLVESTER, this variation in the relative value of gold and silver is seized as a pretext for the issue of currency of two kinds; one possessing a definite face value and the other a speculative value, varying according to the market value of the metal upon which it is based. Thus to-day a silver certificate will be worth more than cost; to-morrow less. According to Mr. SYLVESTER, the gain or loss involved may fall upon either the holder of the certificate or the government, and two Congressional enactments are offered to determine definitely who shall take the chances. In the face of this admission we cannot allow the superiority of bullion certificates as preventives of speculation, which is a strong point urged in their favor. It strikes us that the temptation and opportunities afforded for the wildest sort of speculation are very conspicuous. It is necessary at the outset that the government should determine whether it or the depositor should assume the risk of loss or gain, but either way the element of chance is present, and speculation in silver certificates would infallibly result.

Mr. SYLVESTER has handled the subject vigorously and well, and the fact that his system is open to serious objection does not militate against its soundness, for it is more than likely that no monetary schemes have ever been suggested, or ever will be that are without defects. Money in the abstract has never been properly defined, and from its peculiar nature, never can be. It is easy to say what it is not, but almost impossible to determine what it is, and with this negative definition the world must be content. It is neither value pure and simple, nor the creation of the fiat of the government. That both of these elemental properties enter into money is palpably true, but which is the crowning power cannot be told. Money is an entity, but no economist can say which of its two properties is the body and which the soul, nor is it probable that either will ever assume its exact relative importance. Mr. SYLVESTER has exalted simple value at the expense of the governmental fiat, but whether in the religion of money he would be orthodox or heterodox no one can satisfactorily affirm. It is apparent to us, how-

ever, that he possesses decided views of the superiority of value alone in money, unsupported by the dictum of the government (save in the capacity of assayer and weigher), over the significance imparted by the exercise of the arbitrary power appertaining to all nations; and these views we hold to be extreme. His system presupposes that money is simple value, which doctrine we hold to be equally incorrect with that of the moribund Greenback party, which claims that the fiat of the government can create money without the necessity of a standard of value.

Bullion is money in embryo, but it has not reached the state where it can rightly be called money in fact. The attest of the government as to its fineness, weight and value cannot make it money, any more than the gauger's mark upon a barrel of spirits could render it a medium of exchange, and the two acts are identical. Neither could the bullion certificates themselves be deemed money since they are but promissory notes. In fact, Mr. SYLVESTER'S system, were it adopted, would result in the retirement of money in its proper sense, and a substitution of a simple exchange of valuable commodities. None can question the absolute correctness of this elemental form of exchange, but the medium employed is not money. The adoption of such a system would be a return to the primitive methods of exchange, and the wisdom of this extreme simplicity in view of the present complications and minute ramifications of trade is much to be doubted. It cannot be claimed that our present monetary system is without a flaw in theory or practice, but we can in a great measure safely trust the evils to adjust themselves. Conservatism is nowhere so strongly demanded as in the consideration of problems of finance, and better, far better, is it to endure our present ills, than adopt as a remedy a system that has objectionable features whose possible injurious effects are so apparent.

INVENTORS AND THE CAR BUILDERS' CLUB.

AMONG the topics for discussion at the April meeting of the Car Builders' Club were automatic freight car couplers, and the heating, ventilating, and lighting of passenger cars. These are all matters of importance, as is evidenced by the interest manifested by the members present, but there is yet a yawning chasm between inventors and railway officials that should be bridged over at once. There has long been a feeling of hostility to inventors by railway owners and managers which has been altogether unprofitable, not only to those mentioned, but to all mankind who have been deprived of the advantages that would have been derived from the use of appliances that contribute to safety and comfort. It is true that railway companies have expended large sums for heating, lighting and ventilating, but no satisfactory system of ventilation has yet been brought into general use, owing partly to the difficulties to be overcome in admitting air and excluding dust and cinders, and partly to the treatment inventors receive at the hands of officials, which discourages them; and with no hope of success they leave the field. Let it be understood by inventors that railway officials are willing to pay reasonably for meritorious inventions, and there is no doubt that these much desired improvements will be brought out in due time. As a rule, inventors are too poor to spend brains, time and money in perfecting inventions for the good of mankind with no hope of a reward, and unless they are assured of better treatment in the future, railway improvement may be considered at an end. It is not expected that railway officials will adopt all of the thousand and one alleged improvements that may be brought to their notice, but they can at least select what seems the best, and test them and pay for those that are satisfactory.

It was proposed at the meeting here mentioned, that a board of experts be appointed by the club to examine inventions and decide which of them have sufficient merit to warrant a trial. It was argued that the duties of car builders were such as to preclude the possibility of their acting on such a committee and do justice to all concerned, and it was also urged that railway companies would hardly be willing to allow their car builders to act on such committees and pay them for the time expended. Several inventors present signified a willingness to subscribe to a fund to pay a committee of experts to examine railway inventions and devote their time wholly to that. There is no doubt that some arrangement of the kind would be satisfactory and result in much good. But probably the worst thing to get over is the car-couplers, of which there are by far too many thousands for profit to any one. It was stated that the endless number of coupler patents made it too great a task to tackle with a view to selecting the best. One gentleman present stated that something must be done at once in the way of safer couplings, and that although it is not an easy matter to decide as to the best coupler, the only way is to make a move and keep taking the best until satisfaction is arrived at The longer a vigorous move is postponed, the greater the obstacles in the way. The public are becoming restless at the great loss of life in coupling cars, and legislative enactments may force railway companies to use couplings that are not the best, or as good as they would select of their own accord. The railways will promote their interests by acting voluntarily in the premises. It is not always pleasant to the public to interfere with railway management, but unless the managers show a disposition to make an effort to stop the slaughter caused by the deadly coupler and frog, there will certainly be an unpleasant interference in railway management by the authorities. Practical railroad men are better judges of safety appliances than professional law-makers, and if they will act in the matter at once and convince the public that they are alive to the importance of safety coupling devices, and foot guards for frogs and guard rails, they will save themselves a great deal of trouble and annoyance that will surely arise from unwise legislation enforcing the adoption of inferior or worthless devices, that will be engineered through Congress by politicians who have as little regard for human life as some of our most heartless railway magnates, and who have a share of the plunder for their *influence.*

It would be a dismal state of affairs if railroad companies were forced by law to adopt an automatic coupler for freight cars at a cost of $50 per car, when they can get a superior article for less than $4 per car, and give them the best coupling in the world; yet such a thing may happen unless railroad men will take the initiative, and manage business in a manner that will be more satisfactory to the public than the present wanton destruction of human life.

Railway Associations.

ALMOST every department of the railway service has its association, and much good has resulted therefrom, but some of these organizations might very properly be laid up for repairs. That is to say, that like other railway machinery, they have done much service and need overhauling, rebuilding and improving. Most, if not all railway associations, or associations of railway operatives were organized for the mutual benefit of themselves, the railway owners, and the public at large. In most cases these associations have been beneficial, but in some instances, owing to lack of interest, or bad management, and some crookedness, all has not gone as smoothly as might be desired. Again, as railways increased, the requirements of such organizations changed, and got behind time in railway progress, and need reorganization and repairs. Machinery that was satisfactory twenty-five or thirty years ago would not be up to the requirements of to-day; and that is the case with some of the associations. This has no reference to the mutual insurance department of associations, but will deal more directly with what will improve the condition of railways and contribute to the safety and comfort of all who have to do with railways either as employés or patrons.

An opportunity for an interchange of ideas is afforded by meetings of associations, and the knowledge gained at these gatherings is valuable alike to the members and their employers. Men of long experience attend these meetings loaded with the idea that their ideas are correct and eminently sound, and entertain a sort of mild contempt for the opinions of some of the younger members on account of their lesser experience. But it frequently happens that veterans return to their homes full of new ideas gained from young men whose experience is limited as compared to their own, and there is no better place in the world to correct errors of opinion than at a club meeting or convention. If a member has made a mistake and is laboring in the wrong direction, he will be convinced of his errors and started aright.

It is usual for those who seek advice to apply to those who have a reputation as experts in the particular line on which they desire an opinion. This is the right thing to do, but it is unsafe to put too much reliance on one man's decision. He may have a pet scheme of his own, or he may be using his influence for a friend who has given him lucre, which hath exceeding great power in warping a man's judgment. Or, he may form a wrong opinion of the merits of the device. Recently a prominent engineer was asked his opinion of a very simple device, which he condemned in unqualified terms, and regarded it as utterly worthless for the purpose for which it was designed. Now it so happened that the device had been thoroughly tested (without his knowledge) and found in practice to work admirably. Had the inventor of the device sought the advice of the great engineer at the start, the world would have been deprived of the use of a valuable invention. Incidents of this kind occur almost daily, which proves the danger of placing entire confidence in a single authority. Indeed, opinions are not to be trusted at all except in rare instances, and nothing short of practical tests can be relied upon with safety. The opinion of a *Board* of experts would be worth something, but a single individual opinion is dangerous for reasons other than those mentioned above. One man produces an invention which he believes to be valuable, but not having sufficient confidence in his own judgment, counsels with an engineer or mechanic, who tells him he has an excellent device, and advises him by all means to push it. He then uses up all his own means and all he can borrow, and finds when too late that all his labors have been in vain; that his invention is worthless.

Briefly, then, it is unsafe to rely on single opinions, and the only way out of this difficulty is to give practical tests, which shall be conducted by a board of experts of unquestioned ability and integrity. It is an easy matter to secure the former qualifications, but in these days of universal crookedness it may be somewhat troublesome to secure the latter requisite. However the importance of the matter is sufficient to warrant a trial, and it would seem that a check might be put on rascality, which in this case may be more fancied than real. At all events there are numerous meritorious devices that are out in the cold, for the reason that the inventors have been advised by some one in whom they had confidence that it was not good, or because he could not get it tested practically.

Again, some of the railway associations, or rather some of the members, regard it as too laborious a task to select the best of any line of inventions and give them a trial. They say life is too short to go through a long list of patented inventions and determine as to their relative merits, but it seems to be a very thin excuse to refuse to adopt any meritorious improvement for the reason that out of so many they might not get the best. Moreover, many railway officials regard any change in appliances as too expensive, and continue the use of inferior and worn out machinery. Go through any thriving manufacturing establishment and you will be told by the superintendent that he changes his machinery just as often as any improvement is brought out. Recently a printing establishment changed machinery at an expense of $300,000, which displaced that which was by no means worn out, but only sold for a few thousand dollars for old iron. If individuals find it to their advantage to secure the latest improvements, it would seem that railway owners might also economize by getting the best that can be secured by any reasonable outlay. Of course it is easier to suggest remedies for the evils under consideration, than to apply them when there is so much red tape to contend with, but personal interest should never stand in the way of any invention that will prevent accident, or in any manner contribute to safety of life and limb, or health and comfort.

Among the railway associations that are specially organized for the prevention of accidents we may mention the Yard Masters', Road Masters', Master Mechanics', Master Car Builders', Association of American Railroad Superintendents, and the various engineering associations, all of which have more or less to do with the improvement of American railways. Thus far these associations have made a specialty of matters relating to their particular departments, but as some of the members of these organizations are heads of various departments, it affords them an opportunity of being conversant with the wants of railway improvements at large; and in view of the growing demand for improvements, it would seem that a new association might properly be formed by selecting some of the members from the existing organizations and giving them a larger field of operations than is now occu-

pied by any existing organization. Several titles have been suggested for a new association, and none will be suggested here; but as something of the kind is sure to come in the near future, the organizers can select a title to their own taste. The object of an association which shall be an outgrowth of existing organizations will be to establish a bureau of experimental research, and which shall be supported by assessment of mileage or earnings as a basis of all the American railways, and each to share in the benefits arising therefrom in proportion to their assessments. In other words, let some of the railway kings who have made their millions out of railroads, donate liberally to establish a railway experimental bureau, and then let the different roads be taxed to support it, and when a diamond is found among the sand that is thrown in to be washed, let it be divided among the tax-payers.

There are experts enough in this country to take charge of an experimental bureau who can be relied on, and by a little good management such an institution may be organized and supported, and perhaps in a little time might become self-supporting. This is a matter that concerns the railway public, and all that is required is to start properly; and it would seem that with the experience of officers of the various existing associations the "American Railway Association" might be brought out and made a success. Let all railway officials give their attention to this matter, and issue a call for a convention in September next to consider the matter, and something will be done.

An American Exhibition in London.

ARRANGEMENTS are on foot, it appears, for a very comprehensive exhibition of American products and manufactures, to take place in London, in 1885, and the project has been placed in charge of General C. B. Norton, secretary of the recent foreign exhibition in Boston.

The idea is a good one, and General Norton, from his experience in Paris, Philadelphia and Boston exhibitions, should be a good man to prosecute it. The fact is that America has never made a favorable showing at any of the foreign exhibitions. In London and Paris we made comparatively light displays, our railroads not exhibiting at all, and in Vienna our efforts were not commendable, and were rendered abortive by the conduct of the American department. At Amsterdam, last year, we were represented only by a few sewing machines and parlor organs. It has been seen, however, at the Centennial and the Atlanta exhibitions, and at the fisheries exhibition in London, in 1883, that there is almost no department, natural or artificial, in which America cannot offer an exhibition that shall be generally attractive. This is particularly the case in the magnificent show of natural products which can be organized by our great railroad trunk lines, and which would be entirely new to London or any other European capital. It is to be hoped the American exhibition will make a liberal display in this direction as an encouragement to the emigration of the better class of English farmers, very few of whom have yet come to this country, and who would better themselves by coming, besides being very desirable citizens.—*New York Herald.*

General Norton's address is Hotel Vendome, Boston.

DESERTS and rewards go not often together.

Pennsylvania Railroad.

THE following is a condensed statement of the business done by the Pennsylvania Railroad Company, for the year ending December 31, 1883.

NO. 1. PENNSYLVANIA RAILROAD.

Main Line and Branches, Pittsburg to Philadelphia.

	1882.	1883.
General freights	$23,517,178	$24,536,789
Miscellaneous freights	215,409	211,401
First-class passengers	5,567,561	5,812,584
Emigrant passengers	271,016	177,041
Adams Express	462,361	465,266
Carrying United States mails	506,921	484,352
Miscellaneous passengers	123,877	125,797
Rents	172,634	174,582
Total earnings	$30,836,962	$32,017,813
Total expenses	17,878,776	18,321,413
Net earnings from operating	3,973,308	4,676,959
Add interest, royalties, etc	3,973,308	4,676,959
Total net earnings	$16,931,494	$18,373,359
Deduct interest, rentals, taxes, etc	6,162,931	6,429,927
Net income, No. 1 Division	$10,768,563	$11,943,432

NO. 2. NEW JERSEY DIVISION.

United New Jersey Railroad and Canal Company, including Belvidere Delaware Railroad and Flemington Branch.

	1882.	1883.
General freights	$ 7,549,963	$ 7,984,145
Miscellaneous freights	293,215	285,798
First-class passengers	5,184,213	5,490,381
Emigrant passengers	67,032	51,866
Express	324,421	342,229
Carrying United States mails	188,311	178,091
Miscellaneous passengers	70,865	76,030
Delaware and Raritan Canal	553,418	548,055
Total earnings	$14,231,458	$14,956,595
Total expenses	10,169,094	10,804,913
Net earnings from operating	$ 4,062,364	$ 4,151,682
Add—interest from investments	246,926	311,650
Total net earnings	$ 4,309,290	$ 4,463,332
Deduct—guaranteed dividends, interest, etc	4,878,049	5,117,247
Net loss under the lease of United New Jersey Railroad and Canal Company's property	$568,759	$653,915

NO. 3. PHILADELPHIA AND ERIE RAILROAD DIVISION.

Philadelphia and Erie Railroad.

	1882.	1883.
General freights	$ 3,138,456	$ 3,243,573
Miscellaneous freights	115,018	108,845
First-class passengers	660,765	660,454
Emigrant passengers	8,246	7,288
Adams Express	47,900	44,822
Carrying United States mails	27,464	27,498
Miscellaneous passengers	13,564	16,363
Total earnings	$4,011,413	$4,418,843
Total expenses	2,599,535	2,620,824
Net earnings	$1,411,878	$1,488,011
Deduct—interest and extraordinary exp	160,410	172,289
Net eaarnings applicable to pay interest, etc	$1,251,468	$1,315,738
Deduct amount paid Philadelphia and Erie Railroad Company as rental	1,251,468	1,315,738

SUMMARY.

Net income, No. 1 Division	$11,943,432
Less—Net loss, No. 2 Division	653,915
Balance	$11,289,517
From this balance the following amounts were deducted: Purchase of securities guaranteed by the Pennsylvania Railroad Company, $600,000; redemption of consolidated mortgage bonds, $280,860; Allegheny Valley Railroad Company—deficiency in meeting interest guaranteed by the Pennsylvania Railroad Company, $251,519; advanced to pay bond due to State of Pennsylvania, guaranteed by Pennsylvania Railroad Company, $100,000; other advances to same company, $309,491; Frederick and Pennsylvania Line Railroad Company—deficiency in meeting interest, $15,000; American Steamship Company—interest on bonds guaranteed by Pennsylvania Railroad Company, $90,000; advances, $90,000	1,736,870
Balance to credit of income account	$9,552,647
Out of which was paid dividend of 8½ per cent	7,530,650
Leaving amount transferred to credit of profit and loss account for 1883	$2,021,997
Deduct balance in settlement of claims and old accounts and amount charged off for depreciation	603,452
Total amount to credit of profit and loss for the year 1883	$1,418,545
Add amount to credit of profit and loss December 31, 1882	12,184,639
Balance to credit of profit and loss December 31, 1883	$13,613,384

CAPITAL EXPENDITURE.

To provide the additional facilities needed on the Main Line and the New Jersey Division, and to aid in the con-

struction of additional branch and auxiliary lines necessary for the promotion and protection of your traffic, there was obtained—through allotments to the shareholders and the privilege of converting a portion of their dividends into stock, and from the sale of $3,000,000 of the collateral trust loan of the company, the sum of $10,168,450. Of this amount there was expended the following sums, the balance remaining in the treasury:

Pennsylvania Railroad and branches		$2,654,907
United Railroads of New Jersey		365,904
Philadelphia and Trenton Railroad		221,411
		$3,242,222
Advanced during the year for improvements and extensions on branch and auxiliary lines operated by the company	$1,292,139	
Advances on account of constrnction of new branch and auxiliary lines	4,771,836	
Total on branch and auxiliary lines	6,063,975	
Less received from the above companies in cash on account of said advances	956,734–5,107.241	
Total amount expended on capital account in 1883		$8,349,463

On account of the above advances to branch and auxiliary lines, there was received in securities of those companies, $4,997,309.

Traffic, etc., Main Line and Branches.

	1882.	1883.
Tons of freight moved	20,360,309	21,674,160
Coal and coke shipments (tons)	11,157,146	12,426,888
Oil shipments (barrels)	3,972,121	1,756,696

LINES WEST OF PITTSBURGH.

The following statement gives the result of the lines owned or controlled by the company west of Pittsburgh operated by the Pennsylvania Company, and the Pittsburgh, Cincinnati and St Louis Railway Company:

	1882.	1883.
Pennsylvania Company—		
Total earnings	$19,025,661	$19,147,347
Expenses	10,976,121	11,966,297
Net earnings	$8,049,540	$7,181,050
Deduct rental, interest, etc	6,180,162	6,385,846
Balance	$1,869,378	$795,204
Pitts., Cin., and St. L. Ry. Co.—		
Total earnings	$6,660,629	$7,045,314
Expenses	4,694,649	5,141,265
Net earnings	$1,965,980	$1,904,049
Deduct interest, rentals, etc	1,971,546	1,875,357
Balance	$5,566	$28,692
Net profit	$1,863,812	$823,896

The other lines west of Pittsburgh, in connection with which the company has assumed liabilities, or which it controls through the ownership of securities, but which are worked through their own individual organizations, are the Chicago, St. Louis and Pittsburgh Railroad, St. Louis, Vandalia and Terre Haute Railroad, Grand Rapids and Indiana Railroad, and roads operated through its organization, and East St. Louis and Carondelet Railway.

	1882.	1883.
Aggregate earnings	$9,644,713	$9,934,663
Expenditures	7,697,559	7,864,995
Net earnings	$1,947,153	$2,069,668
Deduct rentals and interest	1,909,965	2,187.835
Balance	(profit) $38,188	(loss) $118,167

Of this loss ($118,167) the Pennsylvania Railroad Company, under existing contracts, is directly or indirectly responsible for $11,227, which, deducted from the abovementioned profit of $823,896, leaves:

Net profit on all lines west of Pittsburgh	$812,609

The Pennsylvania Company, after meeting all its obligations, was able pay a dividend of 4 per cent., and carry to the credit of profit and loss a surplus of $72,829.

SUMMARY OF INCOME OF LINES OWNED OR CONTROLLED EAST AND WEST OF HITTSBURGH.

	1883.	1882.	Increase.
Gross earnings from traffic	$105,653,532	$101,514,926	$4,138,606
Gross expenses, excluding rentals, interest, dividends, etc	68,917,056	65,385,714	3,531,342
Showing net earnings	$36,736,476	$36,129,212	$607,264

FREIGHT TRAFFIC.

	1883. No. of Tons.	1883. No. of Tons 1 Mile.	1882. No. of Tons.	1882. No. of Tons 1 Mile.
Lines E.of Pittsburgh & Erie.	57,379,115	5,066,083,175	54,822,558	4,862,702,539
Lines W. of Pittsburgh	26,319,047	2,693,140,873	24,977,807	2,729,844,763
Totals	83,698,162	7,759,224,048	79,800,365	7,592,547,302

PASSENGER TRAFEIC.

	1883. No. of Passengers.	1883. No. Passgrs. 1 Mile.	1882. No. of Passengers.	1882. No. Passgrs. 1 Mile.
Lines E.of Pittsburgh & Erie.	36,584,435	789,134,935	33,657,024	748,484,865
Lines W. of Pittsburgh	12,262,376	366,774,204	11,611,639	369,349,969
Totals	48,846,811	1,155,909,139	45,268,663	1,117,834,834

The aggregate amount of steel rails laid in 1883 on all the lines owned, controlled, or operated by your company east and west of Pittsburgh, was 67,864 tons.

CONDENSED BALANCE-SHEET, DECEMBER 31ST, 1883.

Liabilities.

Capital stock	$92,619,750
Funded debt	59,746,153
Mortgages and ground-rents payable	1,824,027
Penn. Co. for Ins. on Lives, etc., "Trust certificates"	9,143,000
Balance due to other roads	584,477
Pay rolls and vouchers for December	4,399,056
Cash dividend unpaid	61,590
Dividend scrip outstanding	330,360
Sundry accounts due to other roads	11,374,119
Securities owned by the United New Jersey Railroad and Canal Compahy, transferred with the lease	3,859,295
Equipment of United New Jersey Railroad and Canal Company, transferred with lease	2,267,004
Fund for the purchasé of securities guaranteed by the Pennsylvania Railroad Company	3,100,000
Consolidated mortgage bonds redeemed	1,489,610
Balance to credit of profit and loss	13,613,184
	$204,411,625

Assets.

Construction, equipment, and real estate accounts for the railroads between Philadelphia and Pittsburgh	$73,912,855
Cost of bonds of railroads	30,160,691
Cost of stocks of railroads	58,568,560
Cost of bonds and stocks of municipal corporations, coal companies, canal companies, bridge companies, and investments not otherwise enumerated	6,602,464
Managers of trust created by Pennsylvania Railroad Company, October 9, 1878	3,100,000
Insurance Fund	10,000
Mortgages and ground rentals receivable	57,650
Amount expended for the purchase of anthracite coal lands	709,336
Appraised value of securities owned by United New Jersey Companies, and transferred with lease	3,859,295
Equipment owned by United New Jersey Companies, and transferred with lease	2,267,004
Amount of fuel and materials on hand	3,963,457
Amount of bills and accounts receivable, and amounts due from other roads, including advances made to railroad corporations for construction and purchase of equipment used on their lines, viz:—Philadelphia and Erie Railroad Company, United New Jersey Railroad and Canal Company	1,064,818
Sinking fund and redemption account	1,350,440
Real estate	600,144
Philadelphia and Trenton—Construction real estate	108,195
Othcr companies	8,565,018
Cash balance in London	1,135,697
Cash in hands of freight and passenger agents	2,064,651
Cash in hauds of treasurer	5.699,455
	$204,411.625

THE next Annual Convention of the Master Car-Builders' Association will be held in Saratoga, beginning Tuesday, June 10, at 10 A. M. The following is a list of the subjects on which it is expected that special reports will be made, and which will be discussed:

1. On Sharp Flanges—Their Cause and Prevention.—2. On Standard Freight and Passenger Car Trucks.—3. On Brake-Shoes, Brake-Beams, and the Interchangeable Parts of the Brake Arrangements of Cars.—4. Standard House-Car to Carry 60,000 lbs. of Lading.—5. Standards and Appliances for the Safety of Trainmen.—6. Piece-Work in Building Freight-Cars.—7. Plans for Car-Shops and the Arrangement of Car-Shop Machinery.—8. Freight-Car Framing and Trussing.—9. Passenger-Car Framing and Trussing.—10. Automatic Freight-Car Couplers.—11. Automatic Freight-Car Brakes.—12. Freight-Car Roofs.—13. Side-Dumping and Drop-Bottom Coal-Cars.—14. A System of Lettering and Numbering Line Cars.

A RETROSPECT:

BEING A

Complete History of Railroad Progress in America.

Compiled from this Journal, beginning Fifty-two years ago.

CHAPTER V.

PASSAGE OF THE DAYTON AND SANDUSKY RAILROAD BILL—THE BUFFALO JOURNAL'S ANTICIPATIONS OF THE IMPORTANCE OF THIS LEGISLATION TO THE STATE OF NEW YORK—REVIEW OF "INTRODUCTION" TO A PAMPHLET ON RAILWAYS AND STEAM CARRIAGES, WRITTEN BY COLONEL JOHN STEVENS, OF HOBOKEN, NEW JERSEY, IN 1812—EDITORIAL OBSERVATIONS ON THE SAME, IN 1832—A SUGGESTION.

ON the fourth of January, 1832, the Buffalo *Journal* stated its anticipations of the advantages to New York which would result from the construction of the Dayton and Sandusky Railroad. "By a private letter from Ohio, to a gentleman in this village," says the *Journal*, "we learn that the Dayton and Sandusky Railroad bill has become a law. No event, since the completion of the Erie Canal, equals this in its consequences to the State of New York. It annihilates space between the navigable waters of the Ohio and Lake Erie, and removes the last barrier to a regular, rapid, and cheap communication between the valley of the Mississippi and the city of New York. When that road is finished, it will draw all the travel from the southwest through this place to our State metropolis. Let those who shall doubt me—and there will be many such—bear our assertion in mind, and cast it in our teeth when time has proved it erroneous. They will be wearied in waiting."

A most interesting feature of No. 3 of the AMERICAN RAILROAD JOURNAL is a reprint of the introduction of a pamphlet published in 1812. It was entitled, "Documents Tending to Prove the Superior Advantages of Railways and Steam Carriages over Canal Navigation." The author was Colonel John Stevens, of Hoboken, New Jersey, and the publishers, T. & J. Swords, of New York. As the date of the introduction was May 15, 1812, the editor's emphatic manner of bringing the reprinted introduction to the notice of his readers is accounted for fully. "It may be well to premise," he writes, "that the documents here alluded to, were propositions submitted by Colonel J. Stevens, of Hoboken, New Jersey, to the Canal Commissioners of New York, before a spade had been stuck into the ground, for connecting Lake Erie with the Hudson by a railroad in preference to a canal."

Mr. Stevens's "Introduction" is a well-written and readable piece of work. He commits the accompanying documents to the press, he says, "from an estimation of their importance, and from a full conviction of the practicability of the proposed improvement." Further on he remarks with the dignity and confidence of a man consciously ahead of his times: "Although my proposal has failed to gain the approbation of the Commissioners for the improvement of inland navigation in the State of New York, yet I feel by no means discouraged respecting the final success of the project." His opinion was that railways ought "to become an object of primary attention to the National Government," and expresses his belief that "the insignificant sum of two or three thousand dollars," taken from the national treasury, "would be adequate to give the project a fair trial." He proceeds to observe that on the success of this inexpensive experiment "a plan should be digested, 'a general system of internal communication and conveyance' adopted, and the necessary surveys made for the extension of these ways in all directions, so as to embrace and unite every section of this extensive empire." In support of this proposal he makes the statement, based upon calculations, that "the revenue which this mode of transportation, when brought into general use, would be capable of producing, would far exceed the aggregate amount of duties on foreign importations." The necessity of brevity prevents the possibility of reviewing the "Introduction" exhaustively, but one paragraph should be quoted for its historic value: "At a period like the present (May 15, 1812) when the ordinary sources of revenue continue no longer to pour into the Treasury of the United States their tributary streams, and when too we are called upon to make 'arrangements and exertions for the general security;' at such a period the merits of a system promising not merely to facilitate most astonishingly 'internal communication and conveyance,' but to furnish new and abundant sources of revenue, ought surely to command the attention of the general government, and cannot fail to 'be seen in the strongest lights.'" It is surely of great historic interest that our "unpleasantness" with Great Britain in 1812, was made an argument for the construction and control of a system of inter-state railroads. Colonel Stevens proceeds to expatiate on the comparative ease with which railroads could be constructed, "exempted totally from the difficulties, embarrassments, casualties, interruptions and delays incident to the formation of canals," and the wealth they would produce to the individual citizen,—"for every shilling contributed towards the revenue, a dollar at least would be put into the hands of individuals." His mechanical ideas are singularly quotable: "To the rapidity of the motion of the steam carriage on these railways, no definite limit can be set. The flying Proas, as they are called by voyagers, belonging to the natives of the Islands in the Pacific Ocean, are said at times to sail at the rate of more than twenty miles an hour. But as the resistance of the water to the progress of a vessel increases as the square of her velocity, it is obvious that the power required to propel her must also be increased in the same ratio. Not so with the steam carriage—as it moves in a fluid 800 times more rare than water, the resistance will be proportionably diminished. Indeed the principal resistance to its motion arises from friction, which does not even increase in a direct ratio with the velocity of the carriage. If, then, a Proa can be driven by the wind (the propulsive power of which is constantly diminishing as the velocity of the Proa increases) through so dense a fluid as water, at the rate of twenty miles an hour, I can see nothing to hinder a steam carriage from moving on these ways with a velocity of one hundred miles an hour. I will now just observe, that should it be considered an object of sufficient importance, sails might be used whenever the wind was favorable." The remainder of Colonel Stevens's "Introduction" consists of argu-

ments for the making of railways by the Federal Government, based upon considerations of their value for the national defense, and to expeditiously quell internal commotions; the assertion, backed by a quotation from the pen of President Madison, that there can be no constitutional doubt as to the power of Congress to lay out and make such roads; and of facts in the writer's opinion tending to show how "preëminently beneficial" railways were calculated to become to the Southern States. As regards these he thought "the projected improvement . . . . . would at once more than double the value of their products. It appears to me calculated to hold out the most flattering prospects of gain to such enterprising individuals or companies as might be induced to embark a capital in this object." The concluding words of the chapter introducing Colonel Stevens's pamphlet, continuing immediately after the passage just quoted, are these: "But, I consider it (internal improvement by means of railways), in every point of view, so exclusively an object of national concern, that I shall give no encouragement to private speculations, until it is ascertained that Congress will not be disposed to pay any attention to it. Should it, however, be destined to remain unnoticed by the general government, I must confess I shall feel much regret, not so much from personal as from public considerations. I am anxious and ambitious that my native country should have the honor of being the first to introduce an improvement of such immense importance to society at large, and should feel the utmost reluctance at being compelled to resort to foreigners in the first instance. As no doubt exists in my mind, but that the value of the improvement would be duly appreciated, and carried into immediate effect by transatlantic governments, I have been the more urgent in pressing the subject on the attention of Congress. Whatever then may be its fate, should this appeal be considered obtrusive and unimportant, or from whatever other cause or motive should it be suffered to remain unheeded, I still have the consolation of having performed what I conceive to be a public duty." Thus sonorously and conscientiously did Colonel John Stevens, of Hoboken, New Jersey, urge upon the Federal Government of the United States what he believed to be a right policy with regard to the new invention of running steam carriages on railways, in the year of grace 1812. Whatever might be thought of his politics, credit must be given him for superior acuteness of perception with regard to the value of the improvement he recommended, for his patriotism, and his faith in the future performances and unrivaled importance to the interests of the community, of internal communication by the use of steam.

The AMERICAN RAILROAD JOURNAL of January 14, 1832, contains a leading article on the "Introduction" just reviewed. Colonel Stevens was still living. Most of the objections to his theory of transportation, "stated as they were by such men as Gouverneur Morris, Robert L. Livingston, and De Witt Clinton," and advanced "with most undoubting confidence," had vanished into thin air before the light of experience. "Great and flourishing railroads" were then in use, "both in this country and in England." The writer commends especially the sagacity of a note to the pamphlet calling forth his remarks: "'It is probable,' says Colonel Stevens, 'that it may not in practice be convenient to exceed twenty or thirty miles an hour. Actual experiment, however, can alone determine this matter, and I should not be surprised at seeing steam carriages propelled at the rate of forty or fifty miles an hour.' How completely has the Liverpool and Manchester Railroad verified both branches of this remark! how incredible, up to the very day when it was thus verified, did such results seem to the immense majority of mankind!" (In 1884 the anticipation holds good, more than seventy years after it was written.) "Finding his suggestions unheeded in New York, Colonel Stevens, some years afterwards (in 1818 or 1819), addressed a memorial to the Legislature of Pennsylvania, then beginning to be moved by the spirit of internal improvement, recommending a communication between the waters of the Ohio and those of the Delaware, by a railroad from Pittsburg to Philadelphia. But the public mind was not yet ripe; Colonel Stevens was in advance of his age, and his counsels fell on deaf ears. It may now justly be claimed for this enterprising, sagacious and disinterested gentleman, that what others are effecting, he foresaw and recommended long years ago; and the honor is fairly his, of having first suggested, in this country, the advantages of railroads and steam carriages, and of having accurately estimated their speed and power. Our readers will, we are sure, think the space well occupied which has thus been devoted in this first AMERICAN RAILROAD JOURNAL, to an assertion of the sagacity and services of the first American projector of railroads."

"Honor to whom honor is due." You did well and wisely, Mr. Editor of long ago, to commend the unheeded services of Colonel Stevens, of Hoboken; and a capable pen ought to be found for the work, in this more appreciative age, of preparing a biography worthy in its completeness and accuracy of a subject so interesting and desirable as is that sagacious gentleman.

(*To be continued.*)

A New Departure by the Erie Railway Company.

THIS popular company, now known as the New York, Lake Erie and Western Railroad Company, by an arrangement with the Grand Trunk Railway Company, has just inaugurated a Pullman Buffet Sleeping Coach Line, running daily between New York and Detroit, via Niagara Falls, and the main line of the Great Western Railway. Under this new arrangement, which affords the only Pullman Buffet line running through to Detroit without change, passengers may leave New York at 6 P. M. and arrive in Detroit the next afternoon at 3 o'clock, making close connection for all points in Michigan. Returning, passengers from Detroit and all points in Michigan may leave Detroit at noon and arrive in New York at 11 o'clock the next morning. This new departure by the Erie cannot fail to be appreciated by a large portion of the traveling public, to whom it will be a great convenience.

THE offices of the Rand Drill Co., Manhattan Mining Co., Rendrock Powder Co., J. R. Rand & Co., A. C. Rand, and N. W. Horton were removed from 240 Broadway to more convenient quarters at No. 23 Park Place, on the 1st inst.

FORTUNE often rewards with interest those who have the patience to wait for her.

Communications.

Road-Bed, Track, and Its Fixtures.

Editor American Railroad Journal:

THE title of this article is one used by "Beginner," of Troy, in the March number of the JOURNAL, and as the subjects mentioned in his article are of great importance, the title will bear the warming-over process without being styled "Hash."

"Beginner" advances some sound ideas, and his remarks bring to mind the plantation philosopher's idea of the "fifty-dollar saddle on a twenty-dollar hoss." There are not a few roads in this country that run gilded palace, hotel, dining, sleeping and day coaches over tracks that are not in condition to carry such stock with any degree of safety, comfort, regularity or economy. It is certainly very desirable on the part of officials to please their patrons, who are by no means averse to style and elegant equipage, but if they were consulted in the matter they would doubtless prefer less gaudy trappings and greater safety of track and fixtures, or a less expensive saddle and a safer and stronger horse. Accidents from spreading of track are frequent, and this class of accidents is usually very destructive of life and property. Enormous sums are paid annually for people killed or injured from this cause; and to replace the gorgeous palaces on wheels that are made into splinters and burned in wrecks caused by spreading of track, is a heavy drain on the company's treasury. And yet, if an inventor of a cheap, effective and durable device to prevent rails from spreading were to offer his wares to a railway official he would be "fired" out of the office. It is not a difficult matter to build a track that will not spread, and an outlay of a merely nominal sum would save many lives and much treasure.

Truly the ways of some railway officials are past finding out, and why they will persist in refusing to put their tracks in a safe condition, and continue their wanton destruction of life and property is not easy to understand. The foundation of railway prosperity rests with the condition of the permanent way, and if that is neglected all is lost. Rolling stock may be in good condition when brought on the road, but it soon goes to destruction; and the road, with all its fixtures, equipment, appurtenances and owners all go down together in a common ruin. It matters not that the operatives have had experience and have been trained on the best managed roads in the country: they are powerless to perform in a satisfactory manner for want of tools. Train despatchers, conductors, engineers, and transportation men of all grades of the service may be as good as any in the land, but with a rattle-trap of a track their hands are tied. It is a matter of record that our most successfully managed roads are those on which the condition of permanent way has been considered of primary importance. When that is properly cared for, rolling stock can be kept in good condition, accidents will be few, the damage account trifling; and when a road is managed with a view to *safety* it will soon reach *comfort*, and then *luxury*. This has been written for the benefit of those who reverse the order of progress, and commence with luxury and end in a wreck in the hands of a receiver. Read, think, and act.

AN OLD HAND.

NEW YORK, April 20, 1884.

Editor American Railroad Journal:

THE compliments of Pontifex to Paradox, as he is glad to receive the sympathy and condolence of a professional friend. But some of his "old saws" are badly buckled and kinked; need straightening, and setting, and filing, in order to meet the case in question.

I presume your Journal is the place for hard facts in mechanics and science, and that matters of sentiment and affection will hardly fall on fruitful soil, if sent to you, but will be as those "seeds sown by the wayside, which fell upon a rock." Still, in these things, we engineers have to stand as much strain to the square inch section as any, and perhaps more. Also, perhaps our sweetmeats have as much if not more glucose in them, and our pure cider vinegar as much if not more sulphuric acid in it than the most of people have in theirs. Therefore I am glad that you lend a listening ear to lamentations over our and the public's wrongs. Paradox could have added one more old saw, a sort of a buzz saw which squeaks, and squeaks sadly, rusty from want of use. The absence of employment is not rest for the engineer, but is in the same straight line with the absence of the comforts of life, not to say luxury. Few of us, O alas! how few, are able to wear diamonds on our shirt-fronts, and how seldom are we able to pass beyond nobler nectar than rye. And neither is the idleness forced upon him by the most ridiculously absurd method of building public works, rest for the tax-payer. True, on this lively planet of ours, no one need be idle. The writer is strong enough to sling a pick, or make mud fly from a shovel, but such work wou'd be waste for himself, and the public's best good.

The ignorance, arrogance, insolence and avarice of the corner grocery statesman and gin mill politician and political economist, steps in, however, and says for science and its votaries, what it was said a certain capitalist said for the public: "What school have these been educated in?" Here is another saw with fresh teeth cut into it. The abscess of moral and mental training is (as a general rule) a common city official. Paradox would eliminate the cancer, but when the sore is the biggest part of the organism, it will take quite a while to grind up the knife to do the job with.

"Education sometimes fits a mind to know which horn of a dilemma to take hold of first." What are you to do about it when you have no choice whatever, and both horns are under you, and you feel as if though the laws of gravity were set aside for your especial discomfort, and you are vainly seeking with both hands for a something to cling to, or a soft place to land into when they become operative again. His friends may, in finding him, judge he is "well corned," but he will say "bring no flowers," I was fooling with a bull's horns; I mistook them for those of a dilemma.

Paradox says, "An engineer's life should be 'real,' 'earnest,' full of truth," and so should that of your tailor, your shoemaker, groceryman, plumber. "His vote should be on the side of good order and good morals." Men of all parties and persuasions will agree with him. "Engineers who love science for itself should take time to study human nature in all its nakedness." It is the province of the engineer to apply the "exact science" in the various arts of construction. Here is presented a great difficulty. How are his exact standards to be applied. The strength of a man is stated to be one-fifth of one H-P. His standard will measure his height, weight, etc. But from the very nature of his exact methods he will meet with perplexity. His text books or tables furnish nothing. He must then extemporize an instrument—resort to an india rubber string in order to meet this case. You cannot make a profile of it; neither can you plot it or make a plan of it.

Pontifex was appealed to by a colored person whose exchequer was in a depleted condition, for pecuniary aid. A promise of assistance at a not remote period, drew forth the assertion that "While the grass am a growing, the horse am a starving." And so while the body politic is to be fumigated and purged by the uncertain ballot box, "well-corned horse sense" will hardly be willing to await the slow elimination by the natural selection of evolutionary methods. This horse will not be permitted to partake of the present crop. There will, however, be future crops which will grow green over the remains of those that have starved waiting for the nascent food, and there will be future horses that will devour and grow strong on the succulent herbage.

Future engineering will take care of itself. When whiskey, together with the slower processes of moral and mental evolution have freed the world from leather-headed persons who feel that they must fill some small conspicuous place in order to be happy, engineers will have little to complain of. Engineers are, in fact (aided by the clergy), largely the instruments which are being used to bring about this desirable condition of things.

But if he is sick, "if he loses heart," must he not go to the doctor—must he not have what other men have? Has he not a useful calling? Perhaps the most so of any. It is the present that perplexes us. What shall there be for breakfast in the morning! Let us see the bill of fare. Where can the best boots be had? Who makes them? Stop! not so fast; that transit in the corner is a sick transit, covered with cobweb and dust. It should be sent to the instrument infirmary, "*sic transit gloria mundi*," and that level assures one that life's profile is full of hard gradients.

Not a pessim(on)ist, not with a mouth all puckered up with sourness and bitterness, neither despondent nor gloomy, but with complacent independence. "What will other honorable branches do?" Take us by the hand and acknowledge that we are not "well-corned," but have good "horse sense," and can kick worse than a mule when occasion requires it.

That an engineer must not of need be his own gardener, boot-maker and tailor, his own doctor, lawyer, and servant girl. With as much justice, expect him to be his own army and navy.

Nor permit him to sit on his fence and see a few county officials essaying to erect a bridge with his money, which seems to him as grotesque and funny as the pictures in the last *Puck*, at which a dozen boys and men at the ferry house were grinning the other day with them.

I hope that Paradox and other engineers will bring all kinds of old saws, and new saws, to bear upon this question, and rip, and cross-cut it, until it resembles a Saginaw saw-mill's surroundings.

PONTIFEX.

THE fastest railroad speed on record is recalled to mind by a correspondent of the *Engineer*, who sends that journal a card, which has been preserved since 1848, on which is printed: "The Great Western Railway broad-gauge, 'Great Britain,' accomplished the fastest journey on record, viz.: From Paddington to Didcot, 53¼ miles, in forty-seven minutes. This train was the 9.15 express to Bristol, and consisted of four carriages and vans, and was driven on May 14, 1848, by J. Michael Almond, driver; Richard Denham, fireman."

Sham Tests of the Gibbon Boltless Rail Joint.

A technical journal, of recent date, published an editorial on "sham tests," and it is not easy to understand the position of the writer. He starts out with an evident intention of expressing an opinion regarding the merits or demerits of Gibbon's Boltless Rail Joint, but somehow got fearfully off, and says, in substance, that he does not know but it is the best joint in existence, or, it may be worthless; that is to say, we rather like the device but don't want to say so, or, ahem! we don't see any merit in it, but—well, it is a good thing or it is not, and we shall not express an opinion either way. But he keeps right along, first on one side the fence, then on the other, then crawls under the fence, and gets on the top, and these gymnastic feats seem to strengthen his decision, and he comes to the conclusion that the joint is worthless, and the tests were shams. But on another page of the same issue is an apology for his batch of contradictions. After saying that the "tests" were a sham, and the device worthless, in his apology he says: "We have elsewhere condemned "tests" of the Gibbon rail joint as shams." This condemnation, it should be understood, is aimed at the tests, and not at the joint,* which we have not pretended to discuss. Lest some may attach the opinion expressed of the tests to the joint tested, we publish below certificates favorable to the joint by railroad men who have used or examined it:

H. Patterson, Supervisor of Tracks of the Delaware and Hudson Canal Co., writes at Albany, Jan. 31, 1884:

"The 'Gibbon Boltless Rail Joint' has been successfully tested, and is now in use upon the track of the Delaware and Hudson Canal Co.

"As soon as the weather permits, we shall lay more rail and use this joint.

"It is with pleasure I certify that in places where rails become worthless from battered ends in using the fish-plate or angle-joint, this joint becomes especially valuable as a substitute for them, rendering it unnecessary to remove the rail, and therefore possesses an increased value as a saver of rails."

Thomas B. Purves, for thirty years Division Master Mechanic, Boston and Albany, writes at Albany, Feb. 6, 1884:

"This is to certify that I have this day, in company with J. White Sprong, Secretary Delaware and Hudson Canal Co.; E. A. Pearsall, of Coventry, Chenango County, N. Y., carefully examined the successful application of the Gibbon Boltless Rail Joint to the track of the Delaware and Hudson Canal Co.

"I have read the certificate of H. Patterson, Supervisor of Tracks of said company, and for 20 years or more Track-Master of railroads centering in and around Albany, N. Y. Mr. Patterson accompanied us in our investigations, and says that the joint has been successfully tested in the tracks of the Delaware & Hudson Canal Co. during a five months' test; that no joints have been broken since laid in the track; that it is impossible for the track to spread where the joint is applied; that the rail cannot creep with this joint; that it has an increased value as a saver of rail over the ordinary fish-plate or angle joint where the rails become battered down at the ends, and that the expansion and contraction of the rail is confined to each rail separately. From our examination it would seem to me that Mr. Patterson's claims are well taken."

The following are among the favorable notices (no others have reached us) which have appeared in various technical papers.

The *Railway Rewiew* of March 28 last said:

"In tests and actual service the joint has met its claims and shown itself well adapted to insure a strong joint, the solidity of a continuous rail and absolute freedom from low joints. * * * The following are demonstrated facts:

"1. No repair has been made since the joints were laid. 2. It makes a smooth and continuous track. 3. It removes (absolutely) low joints. 4. The track cannot creep * * * and the joint cannot spread * * * 5. It removes all labor of low joints and loose bolts and utilizes rails which are battered at the ends * * * 7. It saves 1,500 lbs. of steel rail, to every mile of track. 8. The joint is made of Bessemer steel and cast direct from the converter, so that there is uniformity of wear of joint and rail. 9. It must preserve the life of the rail several years, on account of removal of low joints and loose bolts.

"The joint (as shown by the test sheets) is 25,000 lbs. stronger than the rail itself."

The *Railway Age* of March 31 said: A personal observation of it in practical operation enables us to say that it seems to be all that is claimed for it. Altogether the result of practical tests seems to fully bear out the claims made for it as forming a continuous rail without low joints, and preventing spreading and creeping of track."

In view of the above the JOURNAL sent a representative to Albany to examine the Gibbon joints that have been in constant use since September last. These joints were found to be in good condition, both in regard to surface and line, and also correct gauge. The boxing of the downward flange into the tie absolutely prevents spreading of rails, and consequently prevents many serious accidents. The *Railroad Gazette* reports eight accidents in March last from this cause. There was no lamination at the joints, and the ends of the rails showed no more wear than other portions. The joint spikes were all down snug to the head, whereas those at fish-bar joints were up from one to two inches, and loose. The nuts on the fish-bolts were all loose, and the ends of the rails brooming.

The Gibbon joints are placed among other styles of fastenings, and a careful inspection of the various kinds by a competent judge who is not "greased," will not fail to show that the Gibbon joint has many valuable features.

The JOURNAL representative was informed by a trackman in the yard that no work of any account had been performed on these joints since they were laid.

Below will be found some comparative statements and estimates which, with the deductions from tests may be regarded as trustworthy information, based on practical trials, without which opinions are of little value.

Approximate comparative Statement of Tonnage Blows, given in 200 days, on the track of the Albany and Susquehanna yard at Albany; also time required to perform the same by the following leading railroads of the country on main line:

Name of Railroad.	Between what Stations.	No. of Trains.	No. of Cars to each Train.	Approx. Tonnage Blows in 200 days.	Time required to perform. A. & S. Yard Record.	Single or Double Track.
		Pass. Frt. *250	Pass. Frt. *1000			
†Albany & Susq.	Main Line, Albany Yard,	60 8	6 35	5,700,000	200	Single.
N.Y.C. & H.R.R.R.	N.Y. & Spuyten Duyvil,	11 —	9 —	2,590,000	439	Double.
Do.	Albany & Schenectady,	14 5	9 30	483,000	2335	Four.
Long Island	Long Island & Garden City.	35 10	9 30	995,000	1148	Double.
Phil. & Reading	N. Y. & Elizabeth,	8 32	5 20	2,328,000	481	——
Albany & Susq.	Worcester & Oneonta,			2,570,000	440	Single.

* Approximate. 24 hours per day. †Yard-master record. ‡Taken from Time Tables.

The above calculation is based on the supposition that the driving wheels give a ten ton blow, the forward trucks two tons, and Tender and Car wheels four tons blow.

Little or no labor performed on this portion of the track since joints were laid.

*His gun must scatter awfully, for he hits all around.

Marks of the Brush.

BY A VETERAN.

THE care of details in the paint-shop is a subject that but few write about, and but few think of; yet it is that which makes perfect work as well as economy in the use of materials. The details of a shop are the little things, such as the placing or storing of the varnishes, pigments and liquids employed, the economical use of the same, the time of workmen, the correct manipulation of tools, etc.; and as it will accrue to the benefit of some one to have the *little things* looked after, I will make it a text for this article.

William Oakes is a good workman, a very fair foreman painter, and a clever fellow in all, but he passes unnoticed the barrel of "slush" standing in a corner, running over or reeking with nastiness; the floor around and about the bench carpeted an inch or two thick with paint; the paint mills in like condition, and although it is the accumulation of years, perhaps, there is evidently sufficient waste here to paint up a palace car. Oakes is what is called "easy-going"; the work turned out of the shop appears well, but there is a lack of care noticed by the expert. The trucks on this road are painted pea green, or at least are said to be, but we notice that the bottom, or parts "out-of-sight" have never received a touch of the brush; the wood and iron is bare in many places, and certainly this does not look as if the paint was intended as a preservative—simply for appearance; and when the nuts and bolt-heads rust off, or the wood rots out and drops to pieces, no one can tell why it does so. Those parts in sight which were well coated are almost as good as when new. The bottoms of cars, either freight or passenger, might be daubed over with some of the slush from the overflowing barrel; or a few pounds of Grafton paint mixed with oil, even fish oil, might be used to keep moisture out, prevent shrinkage or swelling of the wood, and rust of the metal, thus diminishing the stock of slush and making that part of the shop clean. Step irons, brake rods, shoes, etc., are all the better for heavy coatings of paint. But Oakes sets an indifferent workman at the job, and simply glances at it when it is said to be completed. The turpentine and oil are kept either in large tin cans or in the original packages, barrels, and the idea of improvement in this matter, it seems, has never entered Oakes's head.

No better plan for the storage of turpentine has come to my notice than the use of a safety oil tank, fitted with a pump to raise the liquid, and a drain to return all that falls outside of the vessel being filled, to the reservoir underneath. Not only is this a bar upon waste, but it is a safeguard against fire, for the inflammable substance is closed up in the tank or reservoir, and the evaporation of it is further prevented by a close-fitting cover or lid. Most large carriage factories have adopted them and they prove a success. Varnish stored in cans or barrels in a cold, damp building, cannot be expected to turn out well. It is one of the most delicate things used in a paint-shop. Cold or dampness will cause a sandy or gritty appearance, yet there are many who never give it a second thought. A close-covered tin or sheet-iron tank, with a faucet near the bottom, is best for holding varnish, for being in a large mass it is not so readily affected by atmospheric changes as when kept in five-gallon tin cans. A can for "pour-backs" should be kept for doing common parts or for mixing in paint, and in no case should the leavings in the varnish pot be returned to the tank.

Oakes keeps his men busy most of the time, but there is much time lost in rigging scaffolds, benches, planks, moving shop-fixtures about, etc., that he never seems to care about. Again, men are kept waiting for material at times, and although they are apparently busy, they are digging around here and there to make a show of doing something, when they are simply killing time. Small brushes are frequently used where a large one would do better and quicker work. An "old stump" can not be made to work as well as a good brush, and as soon as the tool becomes worn out it should be cast aside as worthless.

Oakes does most of the striping and ornamenting, and although he does it well, as a rule, he is not careful of some of the little things connected with that branch of the business. We frequently see the patterns or pounces which took him several hours to make, lying torn upon the floor, and utterly ruined, when with care, in putting them away in a box or in hanging them in a closet, they would answer for good service a long time. The pounce-bag may be found almost anywhere, there being no place for it, consequently a full half hour is wasted in hunting for it. Here is a lot of striping and lettering pencils stuck upon the window with tallow; some are straight, others crooked, while one or two are just upon the point of falling to the floor to join a dozen more long since groveling in the dust, when a nice tin box with a cover would hold them, clean and free from dust. The little details might be still further enumerated, but I believe a word to the wise is sufficient, and as it is only my province to make mention of a few and let others go on in the discovery of all that tends to injure the work or profits, I will say no more on this subject at present.

The gilding done in our shop—of late a large portion of the ornamentation is flat scrolling in leaf—gave us some uneasiness as to the *waste;* no better word can be thought of, although with all the supervision given to the gilder, no vicious disposal of gold could be discovered. John Wise was our gilder, and he had an idea that he knew all about the work. He had a nice little box in which he kept the scrap gold, and another for the bunch of cotton used to wipe off the superfluous leaf, and it had always been the custom to allow the gilder to sell the waste to a refiner, as a perquisite or addition to his salary. This appeared well enough, but the use of gold leaf had become so extensive that the office folks were getting anxious to know where the gold went.

Wise was in favor of laying the leaf direct from the book; that is, he used no tip and cushion in laying it, and he also was careful to lay a full leaf wherever it could be done, which made his work appear smooth and even. Now he might have gilded many parts of the work by lifting small pieces and laying them on with the end of the finger; but no, he was looking for more scrap leaf, and after running over the size, he would wipe off the loose gold and stow it away in the box. This plan went on for some time, until the pressure from the office was so great that a change had to be made. Wise didn't like this, but it couldn't be helped. First we tried the cushion, knife and tip of the picture-frame gilder, but after one car was done in that manner these tools were discarded, and resort

had to wetting the gold book leaf with turpentine, then laying it upon the gold; it would adhere nicely, so that when the gold was placed upon the size it would stick to that, the parts which did not strike the size would remain upon the paper to be put upon some other part of the scroll. By this means there was scarcely any waste, but we did not like the plan, and so took hold of another one, viz.: We first cut off the back of the book, then lifting the first paper leaf we rub it over lightly with a piece of wax or paraffine candle to give the paper a slight stickiness, then return it to the gold and gently rub it smooth; the gold leaf will adhere to every part of the waxed paper, and it may be placed anywhere on the size without making any loose leaf or waste. This plan worked well, and we saved a large lot of gold; but Mr. Wise did not like the new plan so well, for it prevented him from making an extra shilling, and, too, the work had to be washed with soap and water to remove the greasy film which was left on the face of the leaf. Al' our gilding is done in this manner now, and we have yet to learn a better plan.

For striping we use a patented machine consisting of a wheel covered with rubber, as a tire, and this, when rolled over the leaf, will lift and carry it to the size without waste. Wise uses a very durable gilding size which dries "tacky" in about two hours, but the drying quality may be regulated at pleasure. Take of light permanent wood filling, one pint; brown Japan, one-half pint; mix and thoroughly shake these together in a bottle. If wanted to dry quicker, add more Japan, and vice versa. The size should flow smooth without bubbles or fat edges, and the leaf must not be put on until the hand can be passed over it gently without sticking; but when placed directly upon it the size appears "tacky" or "sticky." If the size be too wet the gilding will be rough, and if too dry the gold will not adhere.

The Canada Pacific Railway.

A CORRESPONDENT writing from Ottawa, has inspected the extensions which have lately been made on the line of the Canada Atlantic Railway at the Capital. Up to last fall the line had only been completed to the northern terminus of Elgin street, some two miles distant from the extensive lumber yards of the Chaudiere. The work of reaching that point has been one of considerable expense, including rock excavations and heavy fillings or gradings, but in the month of December last this work was successfully completed and the track laid to within a short distance of the lumber mills, where they have now a number of sidings laid to accommodate the loading of several trains of cars simultaneously. In the new terminus at Chaudiere, a scene of great activity presented itself; an endless number of cars being loaded with lumber ready for shipment. At this point the company have secured a large area of ground which, when the sidings are all down, will give facilities for shipping the lumber with unprecedented rapidity, ordinary cars being loaded in an average of not more than half an hour's time. A walk through the yard of one of the prominent lumbermen of the city, sufficed to show that all the facilities which had been furnished by the company for the shipment of lumber were none too ample. The Canada Atlantic Railway is regarded as a great boon to the trade; never before have lumbermen been given such facilities for the shipment of their product. Heretofore great difficulty has been experienced in obtaining cars, whereas now a simple call to the head office of the company would secure an immediate supply. A new era in the lumber trade of the Ottawa Valley has dawned, and with the facilities now offered for its rapid shipment the year round—instead of the lumber firms, as formerly, having to avail themselves of the limited period of navigation in order to ship their products, and the lumber being thus taken in advance to the market, as it were, to be stored at the points of distribution, and which had a serious effect on the price obtained for it—the fluctuations and depression in the great lumber interest which were felt a few years ago are not likely to occur again, in so great a degree, at any rate, so far as the Ottawa Valley is concerned. Upon making inquiry as to the quantity of lumber shipped by the road, the record for March was given, which showed that an average of twenty-five car loads of twelve net tons each were shipped each day, or 150 car loads per week, and, in fact, recently 175 car loads were shipped within five days, or an average of thirty-five per day. As no foreign cars are allowed to leave empty, favorable rates of freight can be afforded.

Conventions.

JUNE 11.—Yardmasters' Mutual Benefit Association at Atlanta, Ga. Secretary, Joseph Sanger, Indianapolis.

June 11.—Railway Employés' Mutual Benefit Association. At Chicago. C. J. Ressegue, Chicago, Secretary.

June 17.—Association of Railway Telegraph Superintendents. At Boston. Secretary, P. W. Drew, Chicago.

June 18.—American Railway Master Mechanics' Association. At Long Branch, N. J. Secretary, J. H. Setchell, Cincinnati.

September 3.—Master Car Painters' Association. At Boston. Secretary, R. McKeon, Kent, Ohio.

September 10.—Roadmasters' Association of America. Indianapolis, Ind. Secretary, C. R. Meeker, Aurora, Ill.

September 16.—National Association of General Passenger and Ticket Agents. At Boston. Secretary, A. J. Smith, Cleveland.

October 8.—New England Roadmasters' Association. At White River Junction, Vt. Secretary, W. F. Ellis, Woonsocket, R. I.

October 15.—American Street Railway Association. At New York. Secretary, J. W. Richardson, Brooklyn.

October 22.—Association of American Railroad Superintendents. Semi-Annual Convention. At Washington, D. C. Secretary, Waterman Stone, Providence, R. I.

A NEW class of men has appeared in trade and are making their influence felt. These men are the high-priced men. They do business on the merits of their work. They do only the very best work, and strive to build up the name of being a high-priced house. It requires some courage to do this class of business, but we find these firms are invariably prosperous. Many people are sick of cheap houses and botch work. The man who thinks price alone governs trade, labors under a mistake. Price does govern trade with the poorest class of customers in the world, a disagreeable class to do business with, a class who want everything for nothing, and no amount of cutting in the world will satisfy them. They are often, too, the poorest paying class of customers in existence. We are glad the high-priced men are making their influence felt, and we have no doubt of their success.—*Ex.*

RAILWAY officials who contemplate adopting the best foot-guard for frogs and switches, will do well to address this office for full particulars of what is claimed to be the best device for the purpose yet brought out.

Tramways.

American Street Railway Association.

President.—William H. Hazzard, Brooklyn, N. Y.
First Vice-President.—James K. Lake, Chicago, Ill.
Second Vice-President.—George B. Kerper, Cincinnati, O.
Third Vice-President.—D. F. Longstreet, Providence, R. I.
Secretary and Treasurer.—William J. Richardson, Brooklyn, N. Y.
Office of the Association, cor. Atlantic and Third Avenues, Brooklyn, N.Y.

STREET TRAVEL IN NEW YORK.

THE history of the development of street travel in this metropolis during another month, presents features of special interest. A fight carried on with great determination at Albany, has resulted in the passage of one important bill providing for improved means of travel in New York. The contest over another, of perhaps equal magnitude in its potentialities, is not yet over. Enough has been done to show that the projected new cable traction system will not be operated by a company owning a monopoly of rights in the streets of New York. Competition will do something towards maintaining fairness of charges and good service.

The next months, and perhaps years, will witness an unprecedented confusion, we had almost said chaos, wrought by operations necessary to the provision of better facilities of locomotion in this great center of population. The public will bear it good-naturedly, of course, as they always do such things. Meanwhile the poor old car horse will continue to sweat and tug away his wretched life.

Improved cab service in New York may be said to have added a feature to metropolitan street life, making it more metropolitan looking, in short; and new vehicles are being added almost every day. What seems to be wanting to induce a more general use of the cab, is a tramrail which does less mischief to the roadway than that now in use. Were the streets of this city as level everywhere as they are on the thoroughfares having no tramways, the enjoyment of cheap cabs would be greatly extended. During certain hours of the day, the elevated railroad cars are most uncomfortably if not dangerously crowded. There is need for more than the promised variety of economical means of locomotion; and our good speed to every enterprise which promises improvement in this direction, will be seconded by a chorus of amens from this long-suffering public.

Editor American Railroad Journal:

DEAR SIR.—I have carefully read the communication from Mr. A. W. Wright, published in your issue of April, upon the subject of Iron versus Steel for horse railroad tracks. Knowing the careful study given by Mr. Wright to the various engineering problems that come to him, it is with much surprise that I note the conclusion he has reached, in favor of iron. I cannot help thinking that, after further and more thorough investigation, he will revert to his first belief in steel.

The problem is not a new one to me, either in its general bearing or in its particular application to street rails.

For many years I have been connected with the manufacture of iron, for the last year making a specialty of the Girder form of street rail at my own works. This question of iron versus steel was there forced upon me. As a result, after very careful thought, I have given up the manufacture of the rail out of iron (which step has closed the works), and contracted with a large steel works for the manufacture of the same out of steel. In plain words, speaking from the iron standpoint, I have gone over to the enemy.

It is somewhat hard to answer in detail, the communication from Mr. Wright. It appears to me rather a statement of a conviction on his part, than an exposition of the reasons which prompted that conviction. I will not stop to analyze the ingenious theory of the rack and pinion with infinitesimal teeth, for I cannot believe a question of this importance—and one which has, in other directions, been gone over so often before—can be ventilated to any useful extent by assuming theories for purposes of explanation. We want facts.

Mr. Wright seems to infer that the conditions of wear of a street rail are so different from those of a steam railroad rail, that what is applicable to one, is not so to the other. I cannot subscribe to this assumption, but, without discussing it, think we may weed this comparison out of the problem, as being irrelevant. The question after all resolves itself into, given: The *same* conditions of wear. Query: Which is the better material, iron or steel?

Before proceeding with the inquiry it becomes necessary to understand what we mean by iron and what by steel. There is iron and iron, and steel and steel. We cannot fairly discuss the question, or come to a conclusion that is worth a moment's thought, without settling what it is that we are comparing. What, then, are we to take as representing iron? Mr. Wright says *good* iron; this is too vague. One of the most serious defects of iron is just the point which renders some understanding about this necessary, viz., its irregularity. An iron can be made having an elastic limit of about 36,000 pounds and an ultimate strength of about 53,000 pounds; certainly *good*, as iron goes. We can secure this by the selection of old rails.

Rolling this into a tram rail, what is the measure of its average life?

Not ten years.

Another iron can be made with almost the same elastic limit and ultimate strength as the above, either from puddling or scrapping selected stock, the measure of whose life may reach, under the same conditions of wear, not less than eighteen years. This example is from practice.

Take a further proof of this irregularity.

Mr. Wright states, quoting Mr. Price Williams as his authority, that the average life of the best quality of iron rails is about 15,000,000 tons. As an extreme, against this averge, take the following. The Cambria Iron Co. have rolled iron rails that have made the average of 48,000,000 tons. I could add to these instances of the irregularity of iron almost *ad infinitum*. Which of the many varieties are we to take? Clearly not an article prepared for a given test; clearly not the very highest quality of iron which may be procured at an abnormal price. It seems to me that we should take as our article that which is commercially furnished in the United States today in the tram rail. If we are to take any specially prepared quality of iron, let us, as a matter of equity, take some specially prepared quality of steel (E. G. Whitworth's Compressed Steel) as a comparative article. If this conclusion be a just one, and I think it is, then the lesson taught by the experiments quoted by D. R. Clark (see Mr. Wright's letter) on the wear of iron rails, is not worth a row of pins.

The question before us is not whether the material called iron *can be made* with wearing powers equal or nearly equal to that of steel. As a matter of science there is no exact dividing point between the two, hence such could be done.

The question is whether the material called iron as in every day use, *is* made with wearing power equal to that of the steel in every day use. Against this ordinary and average grade of iron, what is the class of steel we must deal with?

Without discussing the many varieties of steel, we know that at least ninety-eight per cent. of the steel street rails are made from Bessemer steel and of that grade known as "rail" steel. In this we do not find the same irregularity as in iron. The large amount of business done in steam railroad rails has resulted in making this class of steel a well defined thing.

We have now defined, to a certain extent, our two articles. The question arises, how to compare them. It would be an easy matter to commence on a scientific plan, to give the various tests of stiffness, ultimate strength, etc.; we could give authorities of much weight on both sides of the question, and weave theories that would keep us talking until doomsday—after all to leave the question an open one. Open, that is so far as absolute and incontrovertible proof is concerned. We could do this and still be begging the question. It is one that cannot be dealt with or settled by any particular test or example, or settled by scientific discussion. It is one that will be passed upon by the common sense and the pocketbooks of the business man, rather than by the science of the engineer.

Let us assume for a moment that steel, as a material, is neither better nor worse than iron as a material. There yet remains a determining cause in its favor, and one of such importance that it alone would settle the dispute, viz., its homogeneity. Iron cannot be made homogeneous. I mean the iron we are talking about. I say this emphatically. The iron rail is composed of successive layers of iron piled upon each other, heated and rolled to shape. The ever-varying nature of the iron so piled, the varying working temperature of the furnaces, the contingencies of manufacture involving delays and, more than all, the very nature of the pile, necessitating lack of mobility of the particles, all contribute to make perfect welding difficult, and homogeneity an impossible thing.

Steel, on the other hand, is rolled from one ingot. Its welding has been done by nature, through chemical reaction, far more thoroughly than it could have been done by man's mechanical devices.

What is left? Either the admission that the article steel is superior to

iron, or the assertion that, treating of the material (I mean as a chemical composition), it is so much inferior to iron as to more than counterbalance the great advantage of regularity and homogeneity. Is this a likely task?

What is the history of steel versus iron for the past ten years?

Take it in steam railroading: it is there settled in favor of steel.

In ship plates, in bridge building, in cables, in gun manufacture, in agricultural implements, in the construction of all kinds of machinery, steel has been steadily and successfully replacing iron. And note this, in many of the above examples the problem is chiefly that of wear.

Dealing generally, take what experience has been acquired in the last nine years' use of steel street rails. It is true the exact and comparative wear cannot be given, but it is equally true that the fact that it *does*, under the same general conditions, largely *outwear* iron is already proved.

I think Mr. Wright's criticism on the value of the worn out rails is based on a misconception. The present value of old steel rails in this market is $19.00 per ton, about the same or nearly so, as of old iron rails.

Yours truly,

A. J. MOXHAM.

Editor American Railroad Journal:

SIR.—In the *Scientific American* supplement of March 22, Mr. F. C. Crowley, of New York, in an interview with a reporter of that paper, gives his opinions as to the difficulties and objections to the use of cable railroads in cities. It seems rather unfortunate that Mr. Crowley could not have extended his visit to San Francisco in order that he might have more thoroughly examined the method of operating street railways by cable as conducted here. In Chicago there is but one line, although of considerable length, and yet transporting an immense number of passengers; here we have seven lines operating under almost as many different conditions, some of the lines being on streets where but little traffic passes, while others, and those operated under the quickest speed, are running through streets having the heaviest traffic and teaming in the city.

With Mr. Crowley's general description of the construction of the road I have no criticism to make, only to say that local conditions in each city govern the construction; and what may be necessary to meet the conditions in our locality may be entirely unnecessary in another. In reference to other parts of his interview, I trust a fair criticism will not be out of the way. Commencing at the point where he refers to the slot of the tube, Mr. Crowley says that it cannot be safely crossed by horses, as the calk of the shoe gets into the slot, and that unless the shoe is raised vertically it is wrenched from the foot. That this may occur I admit, but that it *does* occur *often*, or that horses cannot safely cross the slot is *not* correct. We might as well say that horses cannot safely go along the paved streets of the city, especially the block stone pavements because they would slip down. We know that they do slip down, but I do not know that any person in New York City would say that horses cannot safely haul omnibuses up Broadway because even many fall down daily. All the horses in Chicago and San Francisco together which have been injured during the existence of cable roads, by crossing the slot of the tube would not amount to the injury to the horses doomed to a miserable existence while drawing street cars in one day in either city. Apply to Mr. Bergh for further information as to this.

Mr. Crowley says that the speed of the cars was very irregular, being six miles per hour at certain times of the day, and at other times only three miles per hour. I venture to assert that Mr. Crowley is mistaken, from the fact that the engines driving the rope of the Chicago cable road are by a celebrated maker, and the management of the road would not allow any such variation of speed. The greatest variation from the normal speed of any cable in San Francisco does not exceed five per cent., the average of all the roads being not more than two per cent., and the best less than one per cent. with the greatest fluctuation of work that can occur on the steep grades, when the power required is as much to draw one train up as eighteen trains on a level, and these changes from level to grade are excessive. It is not reasonable to say that such variations in speed as Mr. Crowley states can exist with the machinery in ordinary working condition.

Mr. Crowley says there is great interruption to travel by frequent stoppages, these occuring two or three times a day, and each from half an hour to several hours, which would, I should say, occupy the most of the day. We are well aware that the ropes wear; that is consequent upon usage, but that they break several times a day seems preposterous in view of the results in San Francisco. The following taken from the record of one of the roads in this city is the best answer that I can make. One rope was run 270 days, and during that time the total number of stoppages of the rope except at night were six, in all amounting to 149 minutes; another rope run 379 days and had four stops aggregating 340 minutes; another rope run 510 days, and had a total stoppage of 619 minutes, which included the time of putting it in when new.

The delays which Mr. Crowley attributes to the giving out of the grips or their bearings, or cars losing hold of the rope may exist to some extent in Chicago, but do not here except when a road is first started, and the men who operate the grips are all new and inexperienced. Here the cars are only moved by horses when they are switched off from the cable lines to roads having no cables. Although the cars are taken from one cable to another, and through switches and around curves, we don't find any use for horses for this purpose. Over two millions of passengers are carried annually on the cable railway cars of San Francisco, and the practical result has been that all parallel lines having cars drawn by horses have lost largely of their patrons when the cable lines have started, because the service by the latter was more rapid, efficient and regular than can be maintained by horses under any conditions which obtain here. The speed of the ropes in San Francisco varies from six to eight miles per hour, and the speed of the car can be maintained anywhere between that and stoppage without any difficulty. The cable cars do not run into any trucks or teams, being always able to slack up the speed or stop, as the case may require, always giving the teams ample time to get off the track; and this fact is so well known that some team drivers take advantage of it to annoy and retard the passage of the cable cars for considerable distances.

Here the cars are started without shock, and stopped gently. If the car instantly jumped to the speed of the rope, as Mr. Crowley says, all the passengers would be thrown from one end of the car to the other. Come out here, Mr. Crowley, and you shall be afforded an ample opportunity to examine thoroughly the cable system and its operation, and I feel satisfied you will change your mind, in some respects at least.

W. W. H.

SAN FRANCISCO, CAL., April 26, 1884.

THE Broadway Railroad Company completed its organization a few days ago with a capital stock of $75,000, electing as president, James A. Roosevelt, and secretary, Thomas F. Ryan. The company propose to build a surface railroad from Union square to South Ferry down Broadway. It has not yet been decided what power will be used, but it will not be steam. The cars will probably be run by pneumatic power. The company have obtained the consent of the Astor and Stewart property owners on the route, and are soliciting the consent of the others. The directors are: George Henry Warren, James A. Roosevelt, George G. Haven, William C. Whitney, Brayton Ives, Joseph J. O'Donohue, Wallace C. Andrews, Rowland N. Hazard, Thos. F. Ryan.

THE Brooklyn (N. Y.) elevated road is again under way. The managers expect some of the cars will be running on a portion of the track by next August, and that the road, seven miles long, will be finished by January, 1885. This road will connect the bridge and Fulton ferry with the Long Island system of railways, and the Brighton Beach, Coney Island, Railway. The capital stock of the company is $5,000,000.

WORK has begun on a street railway in Jamestown, N. Y. Five miles will be built in that village. Cars and rails have already been purchased of Philadelphia parties. It is proposed to extend the road three miles, to the junction of the New York, Pennsylvania and Ohio, Buffalo and Southwestern, and Dunkirk and Pittsburgh Railways. The stock, $100,000, is all held by local capitalists.

THE Chicago West Division Street Railway Company are using Lincrusta Walton for decorating the ceilings of their new cars. Quite a number have recently been turned out with this treatment. The effect is good, and receives favorable comment generally.

THE Chicago Crosstown Street Railway Company, of Chicago, Ill., has been incorporated; capital stock, $250,000; incorporators, Uzziel P. Smith, George G. Newbury and C. E. Felton.

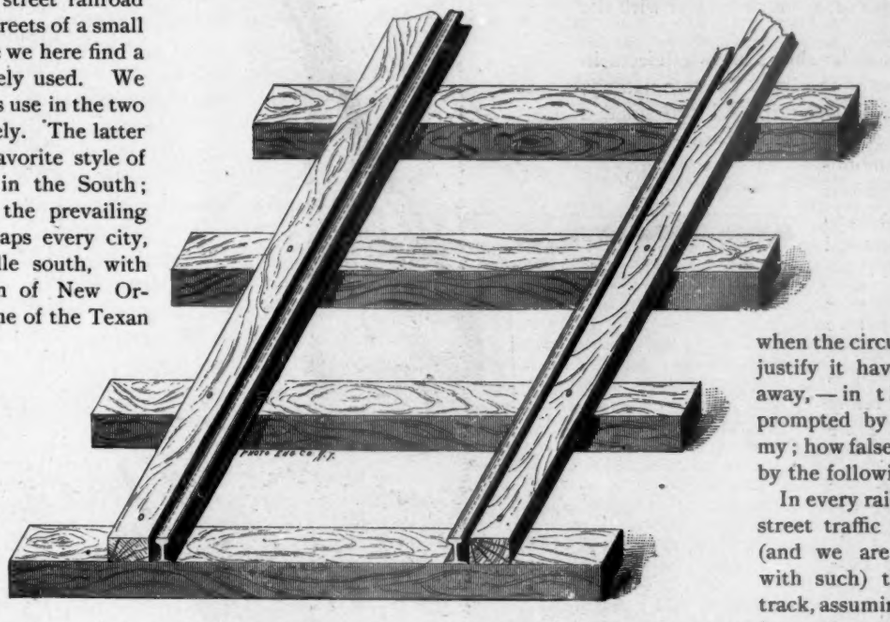
ACCORDING to the return made to the Controller, the gross receipts of the Sixth Avenue Street Railway Company for the month of March were $72,501.

THE first of a series of illustrated articles on Cable Railroads, from the pen of W. W. Hanscom, M. E., of San Francisco, will appear in the June issue of this publication.

On the Tee Rail as Adapted to Tramway Construction.

THE construction of a tramway is a compromise between two diametrically opposite considerations; hence, in its best aspect, it is an abortion as an engineering feat. First: Is the consideration begotten of its purpose, namely, the passage of the tram-car. Secondly: That begotten of its locality, namely, the necessity of its being non-obstructive.

We have repeatedly referred to, and drawn value from the steam railroad system. So far as the passage of a vehicle supported on flanged wheels is concerned, we can have no better; indeed, as an example, no other tutor. Here has been solved, so far as the present state of knowledge can solve, the problem of wheeled passage. It offers as the best type of construction, a Tee rail laid upon cross ties. The need of being non-obstructive is one that we have little to do with in the suburbs of a city, or in the first use of a street railroad in the main streets of a small town. Hence we here find a Tee rail largely used. We will look at its use in the two cases separately. The latter first: It is a favorite style of construction in the South; in fact it is the prevailing style in perhaps every city, from Nashville south, with the exception of New Orleans and some of the Texan cities. It is also used, but to a smaller extent, in many of the smaller cities of the West.



The drawing shown illustrates the general style of construction. The rail is joined by splices, laid on cross ties, and protected by guard timbers on the outside. As a general thing the rail does not weigh over twenty pounds per yard. At first sight this seems a serious error. To be within this weight it cannot exceed two and a half inches in height. Among other disadvantages thus induced are the following: A more or less buried head, a road-bed with the cross ties exposed, or, in a poorly constructed and badly drained street, both these evils.

If the head lies low the rail is dirty, the pulling hard, and the riding uncomfortable. A hard-pulling rail is a costly burden to a street railroad. It is one that eats up the yearly profits by a method that is insidious and certain. It largely increases the operating expenses. This is clearly shown in the extreme efforts made in the large eastern cities to secure a smooth, easy-pulling head, by the use of the heavy center bearing rail, the bulk of metal of which is put into the head for the purpose of increasing its height and lifting it above the surrounding dirt. Hard pulling decreases the paying life, and increases the yearly feed bill of the live stock and, by its continual jarring, rapidly depreciates the cars.

Why, then, its use? It is because of its constructive economy. A street railroad can be built with a twenty-pound Tee rail at a cost of about $3,200 per mile. It is unquestionably a fact that in many cases, particularly in the smaller towns, that a first investment in street railways is gone into as an experiment. Whether this should be so or not, we need not stop to inquire. Being so considered, it is argued thus: "Should the town grow rapidly, it is known beforehand that the Tee rail is doomed. It is an obstructive rail; with growth of the town comes large increase in the street traffic, and as a result, the need of a non-obstructive rail. This being so, it would be a useless waste to use a heavier rail. It would outlive its day. On the other hand, should the contemplated growth of the town not reach the expectations formed of it, the extra cost is but an addition to the loss that ensues."

These reasons prompt, and in some cases justify the use of the light rail. It is however a fact, that because of its use in the legitimate field here noted, this cheap style of construction is often adhered to when the circumstances that justify it have long passed away, — in these cases prompted by a false economy; how false, will be shown by the following:

In every railway where the street traffic is not a factor (and we are only dealing with such) the life of the track, assuming it to be kept in good repair, is measured by the amount of rail offered for wear. When this has been worn off and the rail has to be discarded, there is left a certain value of old material. The difference between the original and remaining value of the rail represents the cost of the use of the rail. We will call this wearing cost. Everything else, having lived its life, is absolute waste.

The problem of good construction may be expressed as an axiom. The wearing cost should bear the largest possible proportion to the total cost. Let us compare the light Tee rail with the Tram rail in this respect.

In the ordinary type of stringer tram track, the cost of construction under the circumstances we are discussing, would be about $5,200 per mile of single track; this, with a five-inch rail of steel, weighing forty-five pounds per yard, costing say $48.00 on the ground. When the rail has decreased in weight to twenty-eight pounds per yard it must be discarded. The wearing cost will then figure as follows:

WEARING COST OF 45-POUND TRAM RAIL.

Original cost per mile, single track, 70.70 tons at $48.00	$3,393 60
Discarded rail, 44 tons, at $20.00	880 00
Difference	$2,513 60

or 48.45 per cent. of the total cost.

With a Tee rail weighing twenty pounds per yard, and costing the same, which must be discarded when worn to fourteen pounds per yard, the wearing cost will be as follows:

WEARING COST OF 20-POUND TEE RAIL.

Original cost per mile of single track, 31.43 tons, at $48.00	$1,508 64
Discarded rail, 22 tons, at $20.00	440 00
Difference	$1,068 64

or 33.08 per cent. of total cost.

Thus it will be seen that as a matter of first construction the economy is much greater with the Tram than with the Tee rail.

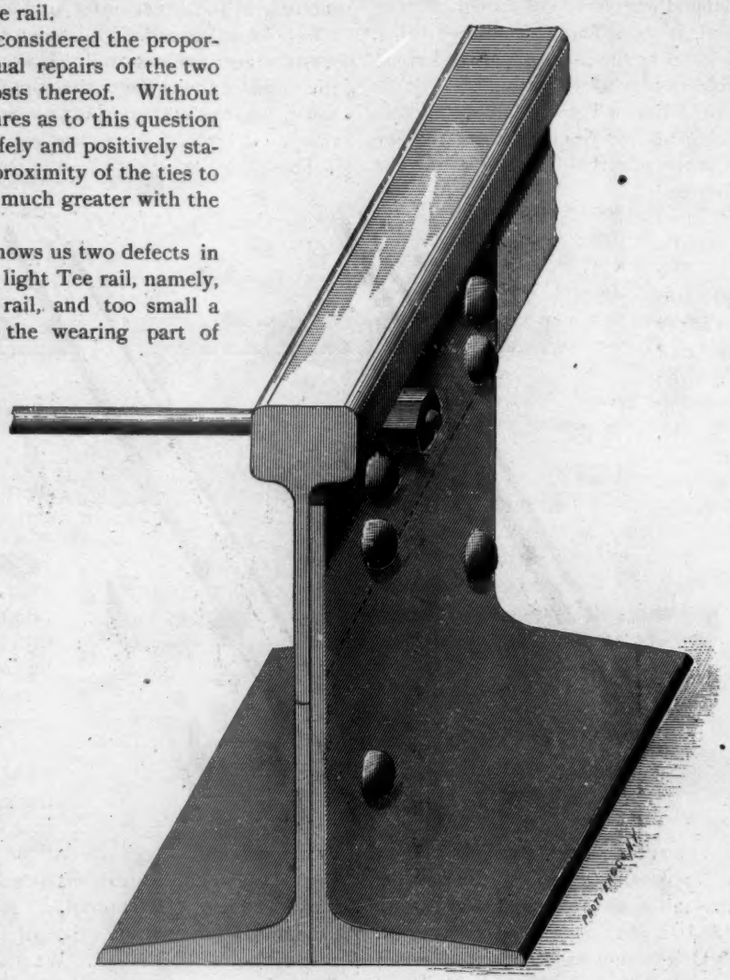
There is also to be considered the proportion borne by the annual repairs of the two systems, to the total costs thereof. Without going into detailed figures as to this question of repairs, it may be safely and positively stated that owing to the proximity of the ties to the surface, this cost is much greater with the light Tee rail.

The analysis so far shows us two defects in the present use of the light Tee rail, namely, lack of depth of the rail, and too small a quantity of metal in the wearing part of the same. Economical considerations will not permit us to increase the total weight, or both these defects could be thus remedied. Of the present design, a twenty-pound rail is too light to be really economical. The heavier the rail in the present type of design, the greater the proportion thereof devoted to the purpose of wear. Hence if we adhere to this design, a heavier rail is absolutely necessary to secure absolute economy. If the permanence of the investment is assured and a Tee rail decided on, nothing lighter than a thirty-pound rail should be used. The only and true province of the light style of construction we have been dealing with, is either where the construction is experimental, or where branch lines are pushed ahead of their time for purposes of occupation into territory which is rapidly growing, and when it is known that it must, before long, be replaced by the Tram.

In places where the growth, while slow is sure, a heavier rail is more economical. The writer can call to mind a street railroad so constructed, using a heavy Tee rail, where the useful life of the stock is from six to seven years, the running speed seven miles an hour, and the daily average per head of stock, seventeen miles. The nature of the road-bed accounts largely for this, it being a dirt or gravel road; but the smooth, easy passage of the cars and consequent light pulling for the stock is an equal if not more important factor.

The inference would seem to be that even where the light type of construction is necessary, the present type of rail might be improved upon.

See drawing herewith. The lower flange is entirely dispensed with; the metal thus saved is partly added to the web, increasing the depth and stiffness, and partly to the head, increasing the life of the rail. The greater stiffness permits the putting of the ties at greater distances apart. To secure a sufficient depth of ballast over the ties, they are thrown well down and the rail connected with same by means of a rolled chair. This chair is riveted or bolted to the rail, provision being made for expansion or contraction by making the holes oblong. The chair is spiked to the cross ties, and presents a much wider base than can be secured by the present rail. The track could be held to gauge by an occasional tie rod. A greater life of rail, together with a well ballasted way that would remain true to gauge, could thus be secured with but little if any greater cost than by the present means. The increased cost, if any, would be so slight as to be more than compensated for by the greater advantages of deep ties and fewer subsequent repairs. In England, and more particularly on the continent, a form of rail somewhat similar to the one here shown seems to have found some favor.



THERE is promise of great activity in railroad building throughout the South, in response to the demand for more extended transportation to meet the development of her timber and mineral lands. Many of the finest and most valuable portions of the country are comparatively unavailable on account of lack of transportation facilities, and it is for the interest of every farmer and producer to aid, so far as possible, in their construction instead of opposing and driving them away, and thus building up a few favored localities at the expense of the rest.—*Artisan.*

Method of Operating Trains on Cable Railroad.

THIS invention, by M. Paul Mayor, Lausanne, Switzerland, is designed merely to be applied on steep grades. It consists in a combination of the cable and locomotive system of propulsion on railroads, by means of a locomotive attached to one or to each of the trains connected by a cable, and moving in inverse directions on parallel tracks, one of the trains ascending, the other descending the grade.

As is the case on all cable railroads, the power created by the descent of one train is almost entirely utilized for the propulsion of the other train; and the resistance to motion of the train going up grade moderates the velocity of the other train, to an extent, in many cases, which the most powerful brakes could not effect; thereby contributing to the immunity from accidents on the steepest of grades.

The propulsive power of the locomotive of the down train will permit the latter, in its descent, to pass into irregularities of grade of the general incline, such as a reduced down grade, an intermediate level or an up grade, over which said train could not pass of its own weight. Thus for economy's sake, or for any other reason, the inclined railroad may be constructed with the above stated irregularities of grade, without rendering impossible the working of the trains, as otherwise would be the case on a cable railroad.

If the down train weighs less than the other train, the propulsive power of the engines of the trains will compensate for the difference of weight between the up and down trains. In fact, if the weight of the down train is no greater than that of the engine of the up train, the latter engine has then all the advantage of a stationary machine, namely, it loses no power in moving itself along the grade.

The loss of power, due to the fact that a locomotive has to use a part of its power to move itself with its train, is enormous on steep grades. It is generally admitted, in order to have no sliding of the driving wheels, that the weight of a locomotive must be equal at least, to eight times the resistance to motion due to the entire train. In this case, on a grade of 620 feet to the mile, a locomotive loses the whole of its propulsive power, and is capable only of ascending the grade without any other load. On a grade of 300 feet to the mile, an engine can draw a train equal to its own weight, and no more; and on as slight a grade as 200 feet to the mile, the weight of a locomotive has to be more than one-half the weight of its train.

If an unavoidable steep grade occurs on a common railroad, instead of augmenting the length of the line in order to lessen its grade, a cable may be laid down on the track along the grade. Then the locomotive working on the railroad, will also work the trains on the part of the line on which the cable is laid, thus saving the expenses of the construction of stationary engines. Moreover, a certain number of freight cars, or any other load, can be kept in reserve at the top of the grade, to be used as counterweights, to help express or fast trains which, coming to the foot of the grade, have no time to lose in waiting to run over the incline for another train coming from an opposite direction.

This mode of propelling trains on a cable railroad, by means of locomotives, does not exclude the use of a stationary engine, hydraulic or steam, or a water weight added to the train going down grade.

It is to be stated, also, that the tension of the cable is lessened by the propulsive action of the locomotive of the up train. Mathematical investigation shows also that the required weight of the cable is always much less on a cable and locomotive railroad than on a cable railroad worked by a stationary engine; for instance on a grade of 100 feet to the mile, the cable has to be twice heavier in the latter than in the former case.

The above able description is from the pen of the inventor, whose method as given, is protected in the United States by letters-patent granted to Paul H. Mayor, Owego, New York, February 5 of the present year.

Hill's Street Car Steam Motor.

THIS invention, of which full particulars may be had from Henry Metzger, of Williamsport, Pennsylvania, or Peter Herdic of the same place, has been tried with satisfactory results on the tramway in Williamsport. This is nearly three miles long, with six very short curves. The motor was stopped in the middle of a grade of fifteen inches to twenty-five feet, with a full load of passengers, and went up without any trouble whatever. Run when a foot of snow was on the track, it was found equal to its work.

Its construction is readily understood. An ordinary street car has mounted on its front platform a jacketed boiler, and under its rear platform a water-tank which is connected by means of pipes, with supplementary water tanks inside the car, and which have steam pipes running through them, like the tank previously mentioned. Connection is made between them and the other tank by means of pipes located near the rear end of the car. These pipes are provided with suitable check-valves. To facilitate the filling of the tanks inside the car, they are connected by means of a pipe, so that the water which is poured into one passes through the pipe and fills both. The closed tank under the rear platform is connected by means of pipes, with condensers situated near the opposite or front end of the car.

A leading advantage of Mr. Hill's motor is, that the machinery employed in it can be placed on the horse cars now in use. The machinery, which weighs about 2,500 pounds, and costs not more than six hundred dollars, is all out of sight; and the car is said to be noiseless in running, and no escaping steam or smoke is visible. All difficulties in running around curves and up grades are stated to be overcome by means of Mr. Hill's anti-friction roller attachment; and slipping is prevented by ingenious appliances which render his street car motor as well adapted for travel in winter as in summer.

Air Brakes for Cable Cars.

WE take the following from the *Mining and Scientific Press*, of San Francisco, Cal., issue of March 29.

It was found as soon as they began running cable cars in this city that the ordinary brakes on the wheels were not sufficient to hold the cars on steep grades, when the cable was released. A track brake was devised, which clamps down on the rails and effectually holds the car.

The brake-block is shod with soft wood, and is found to answer its purpose admirably. The only defect is that it does not work on both the dummy and car by the same operation. The dummy man has to ring for the conductor to put this brake on the car, so that time is lost; which, in an emergency, is quite important. The dummy man can only put on one pair of track brakes. On some roads he puts the track brakes on the car itself in operation, but not those on the dummy.

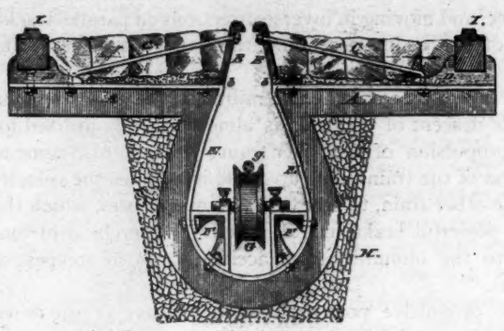
Recently we had an opportunity of examining an air brake invented by Mr. W. W. Hanscom, of this city, which is designed to overcome this difficulty. This brake is applied to one of the dummies and one of the cars of the Clay Street Hill Railroad Company. The object of this brake is to provide a means whereby the brakes on both the car and the dummy can be operated by the gripman on the dummy without having to call or signal the conductor to put on the brakes of the car; for in many cases, in the busy streets of the city, such as the lower parts of Market, Geary and Sutter streets, the conductor's time is mostly occupied in attention to passengers, and the application of the brake on the dummy alone will not stop the train as promptly as is desired. At the time that Mr. Hanscom was engineer of the Presidio Cable Road he saw the necessity of placing the entire train brakes under the control of the gripman on the dummy, and he immediately went to work to study up what should meet the requirements. The air cylinders for operating the brakes are placed underneath the car, and a piston-rod from each end of the cylinder takes hold of a bell crank lever, on one end of which is fastened a wood shoe, which is forced down against the track, forming a skid or track brake. On the dummy is a similar cylinder, and connected in a similar way to the track brakes of the car. The cylinders have air pipes running to each end of the car, and are provided at each end with a cock for closing the end of the pipe when the opposite end of the car is connected to the dummy, so that either end of the car may be connected with the dummy or another car may be attached to the train.

The pressure of air for operating the brakes is generated by an air pump, operated by the foot of the gripman whenever desired, no reservoir for the storage of compressed air being used. By properly proportioning the pump and cylinders the action of the brake is wonderfully prompt, and the brakes on both car and dummy are simultaneously acted upon, two seconds only being required to bring them into action. The simplicity and efficiency of this air brake will commend themselves to those who desire an additional safeguard from accident to those crossing in front of the dummy, and a more perfect control of the train than has hitherto been possible.

DR. BOLT, an Irish astronomer, says the length of the day is constantly increasing, but in a few centuries the change is but a fraction of a second. This information should greatly encourage mechanics who want an eight hour law, in order that they may devote a couple of hours each day to improving the mind by studying books, playing pool, etc. Ten thousand years hence the days will be a couple of hours longer, and this extra time may be devoted to mental improvement after working ten hours a day.—*Norristown Herald.*

296,667. CONDUIT FOR TRACTION-ROPE RAILWAYS: ZACCUR PRALL BOYER, Philadelphia, Pa., assignor to the United States Cable Motor Construction Company, of New Jersey. Filed Feb. 25, 1884.

Brief.—A traction-cable-conduit girder of rolled iron or steel having the horseshoe configuration at its center, and the horizontal wings formed at an acute angle to said central portion, whereupon are supported the slot-irons, and at the outer ends of said wings the track-rails.



Claim.—1. In a conduit for a traction-rope or endless-cable railway, the iron or steel yoke A, of the form approximately of a horseshoe, and having wings extending horizontally therefrom at nearly a right angle, forming level bearings, as at *b*, adapted to receive and support the metallic beams B B, said yoke being rigidly held in position by means of concrete H, all constructed substantially as set forth and described.

2. In conduits for traction-rope or endless-cable railways, yoke A, formed of a single T-rail, or any single rail of iron or steel of the shape shown, bent into the form described, for the purpose of encompassing the walls or sides of the conduit or tubing and also to serve for rigidly holding in position beams B B, chairs D D, and supports F F, constructed and arranged substantially as specified.

3. In a conduit for a traction-rope or endless railway, the combination and arrangement of yoke A, constructed of wrought metal, as described, with wings extending horizontally therefrom at nearly a right angle, and forming bearings *b*, beams B B, connecting-rods C C, and chairs D D, all operating substantially as set forth and described.

THE superiority of *Cassell's Family Magazine*, as a cheap, and, at the same time, elegant embodiment of wholesome and entertaining reading, has been fully established. It has a large circulation in both Europe and America, a fact in every way gratifying to intelligent and right-minded people. Its continued and short stories are meritorious, and its miscellaneous contents cover all the best features of modern magazine literature. Numerous illustrations enhance the many-sided desirableness of this monthly periodical. New York: Cassell & Company, 739 and 741 Broadway.

"ZEPHYRS from the Sea-Shore and Mountain Resorts of the Chesapeake and Ohio Railway" is the title displayed in the vignette of a very handsome and interesting paper, issued by the Passenger Department of the Chesapeake and Ohio. The first number for this season will be out on June 1st, and may be obtained by addressing "Zephyrs," Passenger Department Chesapeake and Ohio Railway, Richmond, Va. The paper will be issued semi-monthly during the summer season, and will be devoted to the society news from the Summer Resorts on the line of the Chesapeake and Ohio.

MIXTURE FOR CLEANING PAINT.—Dissolve two ounces of soda in a quart of hot water, which will make a ready and useful solution for cleaning old painted work preparatory to repainting. The mixture, in the above proportions, should be used when warm, and the woodwork afterward washed with water to remove the remains of the soda.

Lubricating and Lubricants.

BY E. F. DIETERICHS, CLEVELAND, O.

V.

ON FIRE-TESTS AND HEATING OF LUBRICANTS.

THE claim often made for a lubricant, that it is of superior quality on account of its very high fire-test, does not appear to have foundation in fact. The fire-test of a lubricant should be in exact proportion to its ability to absorb frictional heat as fast as it is generated, and should enable it to vaporize and transfer the heat into space before an increase and undue accumulation of it can take place.

On every bearing where metallic surfaces move in close contact with each other, the resulting friction constantly produces heat, and if not removed by lubricating, this heat will accumulate on the metal, cause its expansion and abrasion, and arrest the motion. To prevent this and to ease the motion, we put between the moving metallic surfaces such substances as are able to absorb the heat and vaporize with it into space. The higher the vaporizing temperature (the fire-test) the longer will this frictional heat be retained in the lubricant and on the metal, and thus a lubricant of highest fire-test will have to absorb heat to that high degree before any particle of it can vaporize and transfer the frictional heat into space. The amount of oil thus vaporized, and the constantly proceeding vaporizing process is at any point of time of so small a scale as to be almost imperceptible to our limited senses, but we can judge as to the fact by comparing the lowering or increasing temperature on such bearing with that of the surrounding atmosphere, from the total disappearance of nearly the whole of the amount of lubricant used there during a period of time, and the well-known fact that vaporization cannot be caused without applying heat, and continuous vaporization can only be maintained by continued application of heat.

It then follows that the higher fire-test of a lubricant is by no means an indication of its better qualifications as such, and if we are able with an equal quantity of lubricant of lower fire-test to keep the temperature on the bearing proportionately lower also, the latter lubricant must be the more efficient and economical one, aside from the important fact that the lubricants of highest fire-test are compelled to become decomposed under the influence of constant exposure to that amount of heat which they are obliged to absorb and hold, ere they attain the temperature at which they can vaporize.

Cylinder-oils should have a fire-test low enough to allow their ready vaporization under the frictional heat they have to remove from the metallic surfaces in the cylinder in motion and contact with each other, and escape with it into space through the exhaust; and only high enough to allow clinging to the metal, without being decomposed or too rapidly vaporized by the high but moist temperature, and uselessly blown out by the steam.

Many things are done from mere habit without for a moment considering the cause or the result of the action. It is so with the almost universal and persistent custom of engineers and mechanics to keep their oil cans in warm places on the cylinder-chest or heater, no matter what kind of oil they may be using. This undoubtedly arises from the fact that most oils for lubricating are either reduced mineral oils, fatty oils, or mixtures of both, all of which readily congeal, and therefore require to be kept in warm places in order to have them ready for immediate application. This becomes such a habit with engineers that they will treat and look upon all kinds of oils in precisely the same manner; and oils that flow freely at all temperatures, and oils that require previous heating to become limpid enough for application can be seen standing side by side in the hottest place in the engine-room. No thought is given to the fact that every degree of temperature thus forced on an oil, previous to its application, above that which is necessary to keep it fluid, is a waste of its lubricating power and consequent needless increase of cost. Oils of high fire-test congeal at lowering temperature, and require the accumulation of considerable heat before they can be easily applied for lubricating, and they leave gummy deposits. Lubricants of lower fire-test do not thus congeal; they retain their consistency nearly uniform at all temperatures, and their preliminary heating is therefore an absurd practice—simply a habit, and positively contrary to reason.

When we consider that lubricating means the removal of frictional heat produced by motion, as fast as it is produced, or in plainer words, "to keep the bearing cool," we will have to admit that the lubricant applied at a temperature equal to the surrounding atmosphere must be able to absorb and dispose of more frictional heat than one that has been heated some hundred degrees or more previous to being applied; and the heat on the bearing must increase and accumulate until it reaches the temperature at which the lubricant was applied, and then only the real working of the latter can begin and absorb the further increase of heat, and dispose of it at its vaporizing point.

This accumulation of frictional heat, though almost imperceptible to ordinary observation, means increase of friction and dragging on the machinery, thereby causing loss of power, increased wear and cost. This waste is in exact proportion to the uncalled-for increase of heat forced upon the lubricant, and depriving it of a valuable portion of its lubricating power. The astute engineer then gives his verdict that the oil was not good, that it was running dry if not lavishly applied, and that it took more of this oil than of some heavy, greasy oil that may be his favorite.

An oil to do efficient and economical work should, under all circumstances, be applied as cool and direct as possible to the place where it is expected to do the work, and should be of such fire-test and consistency as to allow it, at all temperatures, to cling to the metal, absorb the frictional heat, and radiate with it into space as fast as it is produced.

(*To be continued.*)

DEAN BROS., Indianapolis, Ind., have furnished the Rust Owens Lumber Co. at Drummond, Wis., with a system of water works, including pumping machinery, pipe and hydrants, having a capacity of one million gallons in twenty-four hours.

THE Louisville, New Albany and Chicago Railroad Co. have just received four new freight engines from the Rogers Locomotive Works, of Paterson, N. J.

Our English Letter.

WRITTEN SPECIALLY FOR THE AMERICAN RAILROAD JOURNAL.

PORTABLE RAILWAY PLANT—LIGHTING RAILWAY CARRIAGES BY ELECTRICITY—RESPECTING STEAM TRAMWAYS—THE LONDON AND NORTHWESTERN RAILWAY COMPANY AGAINST THE NANTWICH ASSESSMENT COMMITTEE — PROPOSED DUPLEX BRIDGE ACROSS THE THAMES—THE RUSSIAN SCARE AND SOME OF ITS CONSEQUENCES—FALLING OFF IN IRISH RAILWAY BUSINESS — SOME NOTABLE NEW INVENTIONS — THE KILLED AND WOUNDED BY RAILWAYS IN 1883.

A NOTABLE exhibit at the late exposition in Calcutta was a portable railway constructed and shown by Mr. W. G. Bagnall, of the Castle Engine Works, Stafford, together with a complete rolling stock. The line was laid around the lake and was two feet gauge. It consisted of sixteen pound steel rails in ten feet lengths, secured to channel sleepers by means of clips, which fitted up close to the web of the rail. The inside clips were riveted with two half-inch rivets, and the outside clips bolted with two half-inch bolts. By this arrangement the whole can go away in parts to save freight, and the cost of bolting on arrival does not exceed £5 per mile, and when done, the railway is equivalent to a portable riveted railway, and extra sleepers can be fixed at any point where the ground is not sound. There are three sleepers of channel iron, two feet nine inches long by four inches wide to each ten feet length, and a joint sleeper five inches wide, so that no fish-plates are required. Mr. Bagnall is of opinion that the sleepers should project beyond the rails, the extra length amply justifying the extra cost. The weight per mile of the railway is about thirty-eight to forty tons, and the value about £400 per mile. The exhibit included eight wagons of various descriptions, bogie and otherwise, suitable for carrying sugar canes and other colonial produce, and also three passenger cars and a locomotive. The locomotive has cylinders five inches in diameter by twelve-inch stroke; the four-coupled wheels are of solid steel, fifteen inches in diameter, with a leading pair of bogie wheels twelve inches in diameter. The rigid wheel base, from the trailing axle to the pin of the bogie, is three feet seven inches, and the flexible wheel base is seven feet. The engine will pass round curves of thirty-five feet radius. The weight on the bogie wheels is adjustable, and the total weight of the engine in working order, four and one-quarter tons. The tank is placed behind the foot-plate, and the boiler fed by an injector, and by a triple valve pump worked by an eccentric. The brake locks the four-coupled wheels. The fire-box, which is constructed for burning wood, is of copper, and the tubes of brass, the total heating surface being ninety square feet, of which twenty-one are in the fire-box and sixty-nine in the tubes. The grate area is 2.04 square feet, and the working pressure 150 pounds. There is an awning over the driver, with a spark-arrester in the chimney, and an ash-pan to hold water. The engine is capable, in ordinary work, of hauling loads of forty to fifty tons on a fairly level road. To railroad men nothing could be more interesting than this exhibit, evidencing great possibilities not only in exploration and commerce, but also in war.

Mr. W. H. Massey, of Twyford, Berks, consulting engineer to the Royal Household, has made experiments in lighting railway carriages from a dynamo driven by a separate engine supplied with steam from the locomotive. The results of his researches were recently brought before the Society of Telegraph Engineers, and Mr. Massey expressed his confident opinion that the cost of lighting by this means is considerably less than gas; indeed his experiments demonstrated it to be some thirty per cent. less than gas at twelve shillings per 1,000 cubic feet, and this with about double the amount of light supplied. At least one eighteen-candle lamp should, in Mr. Massey's opinion, be given to each compartment, as one five-candle lamp is too small to yield a reading light. In the opinion of *Engineering*, Mr. Massey has demonstrated by a practical test that the electric light may be supplied in railway trains at a cost rather less than the best gaslight systems now in use, and with a gain of about double the illuminating power. Pintch's and also Pope's compressed gas costs from twelve shillings to fourteen shillings per 1,000 lamp-hours, whereas an electric light of twice the candle power can, in Mr. Massey's opinion, be supplied for eleven shillings per 1,000 lamp-hours. Moreover, the first cost of gas apparatus is nearly double that of the necessary electrical plant. Mr. Massey, writing to your contemporary, says: "In estimating the working cost of the electric light for trains it would be well to remember that the 1,000 lamp-hour unit is the most convenient, and that fifty lamps of twenty-candle power each are required for the great majority of trains, whether these are short and brilliantly lighted, or long and only fairly well lighted."

Mr. J. Compton Merryweather, of Greenwich, writes to the *Times*: "By the adoption of properly constructed tramway locomotives it is conclusively shown in daily experience that steam is doing the work on certain lines at half the cost of horse traction—thus at Stockton the steam street tramway is costing three and one-half pence per mile, while at Dewsbury the figure is almost identical. These lines have been open for two and six years respectively, and are, therefore, not experimental. Horse traction would cost under the same conditions five and one-half to six pence. At Rouen there are roadside steam tramways which have been working for the last five years or more. Again, in the streets of Barcelona such tramways are in work, as also in many parts of Holland, India, Rangoon, etc. I am mentioning merely one or two steam tramways with which I am connected, but there are other lines doubtless as successful in their cost of working."

Your correspondent supposes that squabbles between railway corporations and local authorities take place in the United States as they do here. A late instance of the kind is that the London and North Western Railway Company has entered an appeal at the Cheshire Sessions against an assessment made by the Nantwich Assessment Committee, increasing the charge on the company's property in the Union, from £53,000 to £94,000. The appeal will be heard next sessions.

The Marquis of Hartington has consented to receive a deputation of working men in favor of the proposed duplex bridge, which it is proposed to construct over the Thames near the Tower for free communication across the river, without impeding the passage of vessels. The plans of the bridge bear evidence of considerable ingenuity. Towards the center there is a double way, so that traffic may pass uninterruptedly on one side, whilst the other side is being raised to permit the passage of a vessel.

Russian and British interests clash, or threaten to do so, and John Bull is in earnest to prevent what we call "Russian aggression" at our expense. As examples of practical suggestions looking to this end may be mentioned that General Sir Lewis Pelly, lecturing at the Royal United Services Institution, recently, enlarged upon the dangers of Russian aggression in the direction of India, and, pressing the necessity for an alternative route, urged the advantage of a railway from the Mediterranean to the Persian Gulf, where could be found a convenient point from which to commence the prolongation of the railway to Kurrachee. The length of the railway proposed would be 850 miles, and the cost about £9,000,000 sterling, which, he urged, should be a line under guarantee from the British Government. Moreover, Captain Molesworth, R. N., presided at a meeting of the subscribers to the Jordan Valley Canal Fund, at which the following resolution, proposed by Mr. Edmund Kimber, was carried unanimously: "That in view of the recently issued Russian loan of £15,000,000 for the purpose of contracting their railways through Persia to the Persian Gulf, and from Batoum to Bagdad, as well as to Merv, it is more than ever necessary that the opinion of leading men in India in favor of the Jordan Valley Canal should receive an early and practical response in this country, so as to strengthen and ensure our highways to the East, and therefore this meeting is of opinion that the estimate of the Anglo-American and Anglo-Indian contractors should be at once sent in."

The following figures are interesting as showing how Irish disaffection has affected the railway returns of that unhappy country. The figures represent returns for the first thirteen weeks of the present year, for the mileage given, compared with the corresponding weeks of last year:

	Passengers.	Goods.	Total.	Mileage.
1884.....	£198,862	£221,504	£420,366	1,447
1883.....	207,754	245,813	453,567	1,447
	Dec. £8,892	*Dec.* £24,309	*Dec.* £33,301	.....

I notice some newly-patented improvements, of which your readers will be glad to know something. A new railway wheel is cast in two parts, the tire and arms being cast in one piece, the nave or center forming the other piece; these two parts are bolted together, the arms and the nave having L-shaped (in section) extensions which fit together. In rails and sleepers for railways, depressions are formed in the tops of the sleepers to receive the bottoms of the rails, and the sides of the depressions confine the rails and receive a large part of the lateral strain.

An important invention relates to the construction of tunnels and subways of tubes and masonry in or under water, to the manner of weighting and joining tubes to ordinary masonry, and to machinery therefor; a chamber larger than the tube in transverse section is supported on wheels or rollers or slides against a portion of the tube to be extended, and is forced forward by screws or hydraulic pressure, the material in front being excavated by machines within the fixed tube or chamber.

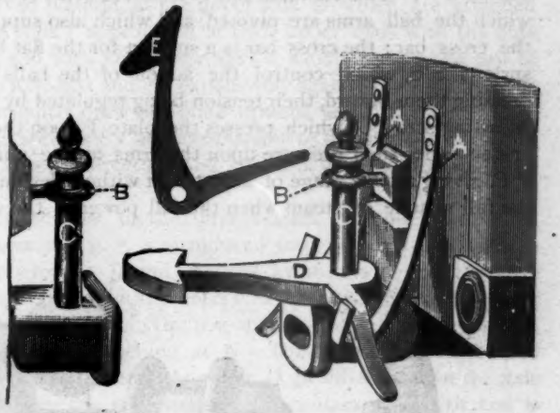
Turning to a less desirable subject: The total number of personal accidents reported to the Board of Trade by the several railway companies during the year 1883 amount to 1,230 persons killed, and 8,123 injured.

H. A. L.

New Inventions.

Bond's Car Coupling.

THE coupling illustrated, patented by C. W. Bond, Toledo, Ohio, aims at uniting cars of different heights by placing the coupler above the present drawhead and without altering it, so that, if desirable, the link can be used



as heretofore. To secure proper strength, the top of the elongated pin is braced by a movable brace which passes through the car, and moves in harmony with the drawhead. The shock or strain is relieved by a spiral spring inside the car. All that is required to adapt the car to the coupling, is to make a hole for the brace to play in, and the coupler is moved from one car to another, by simply withdrawing the pin. In coupling a higher to a lower car, the coupler is placed on the higher one.

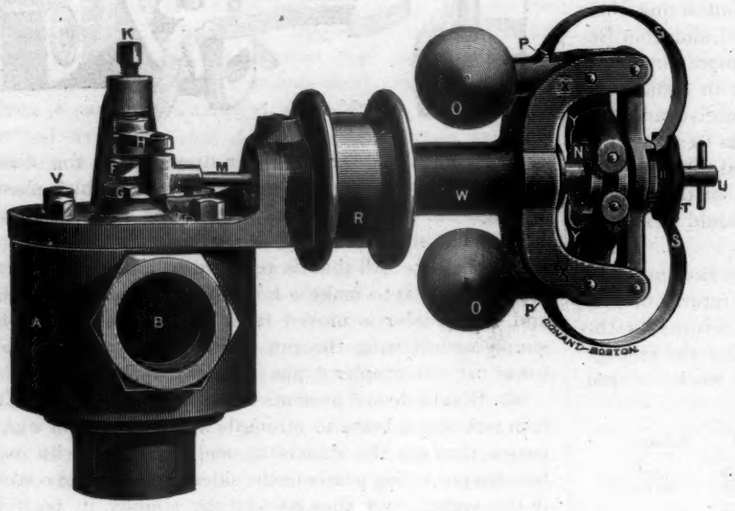
Mr. Bond's device presents two spring rods which hold it in position, a brace to strengthen the pin, a pin which passes through the drawhead, and a coupler with two handles projecting nearly to the sides of the car and resting in the spring rods, thus holding the coupler in position and providing, by their being moved, for the uncoupling of the cars. A coupler with single fluke can be substituted for an arrow-headed one, and one handle instead of two as described, can be provided.

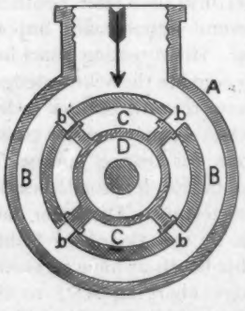
THE well-known Philadelphia firm of Riehle Brothers, have been the recipients of several valuable and important orders for their specialities. Their testing machines are believed to have no superior, and are the acknowledged standard. The manufacturers have recently entered orders for the following: One 100 ton testing machine for chain; one 40,000 pound testing machine for testing springs for the Atchison, Topeka and Santa Fé Railroad, besides several foundry, wire and cement testers. The latter have been adopted as the standard by the Board of Public Works of New York city. Riehle Brothers have furnished their celebrated patented furnace charging scale to the Sharon Iron Company, New Jersey Zinc and Iron Company, and J. C. Beatty and Company, Sterlington; one power hay and straw rope twister goes to Birmingham, Alabama. Goods have been shipped to foreign countries, even as far as Japan. The testing machines of Riehle Brothers have been approved by the British Lloyds and Bureau Veritas, and are qualified to test for vessels made under the rules of these companies.

Wright's Steam Engine Governor.

THIS Governor, manufactured by the Wright Machine Company, Worcester, Mass., is well represented in the accompanying cuts; the construction of the valve stem, by which a steam tight joint is secured, thus doing away with the use of packing, is a feature which will be appreciated by practical engineers,

It is driven by a pulley R, attached to the revolving ball standard W. This standard has two slotted arms X X, in which the ball arms are pivoted, and which also support the cross bar; the cross bar is a support for the flat bow springs S S, which control the action of the balls by pressing them inward, their tension being regulated by the adjusting screw U, which presses the plate T upon them, and so varies their pressure upon the arms at the points P P, giving a wide range of adjustment without lessening the full volume of steam when the full power of the engine is required. As the weight of the balls is not depended on as in most governors, light balls are used, running at a high speed, making it very sensitive, and enabling it to run in a horizontal position, thus avoiding the use of a driving shaft and gears, and making it very compact as well as noiseless.





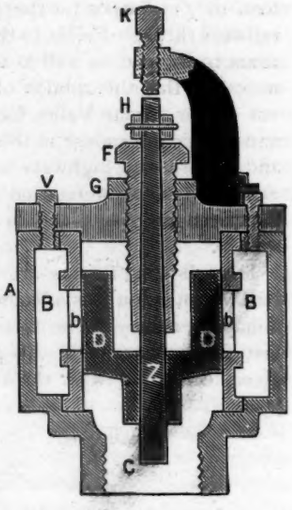
In the forked ends Y Y of the ball levers, are loosely pivoted blocks which revolve in a groove in the head N, fastened to the rod M. As the balls are forced outward and inward, the rod M is moved downward and upward, closing or opening the valve by means of the lever H, which is attached to the valve stem.

The valve stem is slightly tapered, and fits a correspondingly tapered seat in the screw F. The pressure of the steam causes its upper end to press upon the screw K, by which it is so nicely adjusted to its seat as to prevent both friction and the escape of steam, making a steam-tight joint without packing. The annoyance of frequent packing is thus avoided. After the screw is once properly set, it will need no further attention.

This arrangement of the valve stem, together with the quick speed of the balls, and their great freedom of action consequent upon the arrangement of the springs, and their indirect action upon the valve through the lever H, makes the governor very sensitive to slight variations of speed.

The Martin Car-Coupling.

THIS invention, by John Martin, of Knight's Ferry, Stanislaus County, California, relates to a car-coupling of that class in which swinging latches on each draw-head are adapted to fall into engagement with the ends of heads of the coupling-pin. It consists in a peculiarly constructed draw-head chamber, in a staple secured to the under side of the gravitating latch, adapted to receive and throw out the coupling-pin when necessary, and in the means for raising the latches from above or on the side to uncouple the cars. The object of the invention is to provide a simple and effective automatic car-coupling, which shall be able to readily uncouple itself in case of accident, or be easily uncoupled by design.



Described with some detail, the Martin car-coupling has a chamber between the draw-head and a hinged latch. This chamber has a front shoulder for the reception and engagement of a coupling-pin. Means of raising the latch consist of pivoted arms, levers, bail and rod. A staple in the latch receives the point of the pin, which is freed when the latch is raised, whether by accident or design. In the case of a derailment, for example, in which the relative position of adjoining cars would be changed, the raising of the latch would throw the coupling-pin out, and uncouple the cars. The means for raising the latch, as before mentioned, are arms on the latch, levers on the draw-head, the bail upon the sides of which the rear ends of the levers play loosely, and a rod. The coupling may be accomplished by the brakeman from either top or side. The other part of the device, namely, the opposite draw-head, is a duplicate of the part described, and the coupling-

pin is alike at both ends; but if a car provided with the Martin coupling should have to be used with a car having the old style upon it, the inventor suggests that a pin could be made with a conical head at one end and a link or slotted head at the other.

Mr. Martin's ingenious devices are protected by United States letters patent.

Oiler for Car-Axle Boxes.

THE improved box invented by George K. Waterhouse, No. 162 I street, South Boston, prevents the axle from heating, and obviates the necessity of packing with waste.

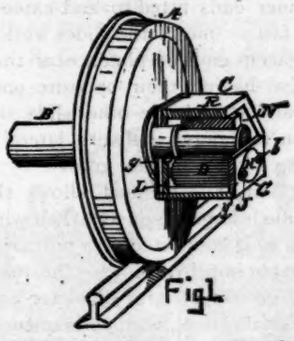


Fig1.

It will also prevent dust from entering the box and cutting the axle, and thus save a great expense to railroads. The improved boxes are of the standard size and can be applied without any changes, thus making a large saving in the expense of lubricating the axle.

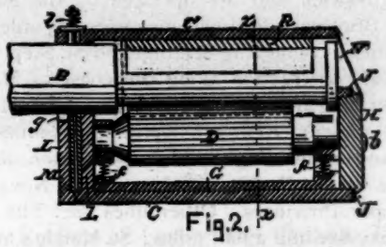


Fig.2.

In the accompanying illustrations, figure 1 is a sectional view showing the improved oiler as applied to the axle; figure 2 is a vertical longitudinal section; figure 4 is a vertical tranverse section, and figure 7 an isometrical perspective view of the oiler detached. A represents the


Fig.4.

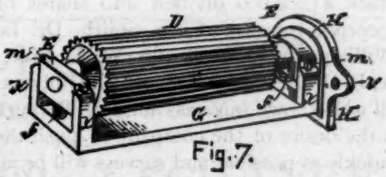


Fig.7.

car wheel, B the axle, and C the box. The oiler proper consists of a cylindrical roller D, journaled horizontally in the boxes E E, which are fitted by means of the ways *m* to slide vertically in the standards *x x*, and provided with the coiled springs *f f*, as best seen in Fig. 7. The standards are connected at their lower ends by a bed piece G, which is attached at its outer ends to the face-plate H, provided with the screw holes *v*. The bed G, provided with the standards *x* and face-plate H, and carrying the boxes E and springs *f*, constitutes a carriage for the roller D, and also a cover for the opening J, which is formed in the outer end *y*, of the axle-box C, and through which the oiler proper is introduced into said box, as best seen in Fig 2. The rear end of the axle-box is double or provided with two walls L L, and adapted to press against the lower side of the axle. There is a curved plate M, at the upper side of which are attached two rods *z z*, provided at their upper ends with the nuts *i i*, and with coiled springs *l l*, which rest on the top of the axle-box and act expansively against the nuts, so as to constantly draw the plate upward and against the axle. The springs *f f* act expansively to force the roller D in an upward direction, and to keep it in constant contact with the axle B.

In the use of the improvement, the oiler proper, as shown in Fig. 7, is introduced into the axle-box through the opening J, and secured by means of the screws *b* passing through the holes *v* in the plate H, into the outer end of the box. The box is then properly filled with oil, through an opening at N. The quantity is sufficient to partially submerge the roller D, or so that when the axle revolves, the roller which is in contact therewith and is revolved thereby, will take up the oil and lubricate the axle in a manner which will be readily understood by all conversant with such matters, without a more explicit description. The object of the plate M is to pack the axle at the inner end of the box in such a manner as to prevent the dust or dirt from entering the box through the opening *g* beneath the axle. The bearing of the axle R is placed in its usual manner. It will be obvious that the axle will be constantly supplied with oil by the roller D, and thereby be prevented from heating, and that Mr. Waterhouse's improvement entirely obviates the necessity of packing, or stuffing the box with cotton waste, in the usual manner, thus making a very large saving in the expense of lubricating the axle.

The Automatic Center Car Brake.

THIS brake is an attachment which does not interfere with the brake now in use. A vertical shaft with crown wheel is fixed under the car, to which are attached chains to tighten the brake shoes also attached to it, so that said chains can be wound taut. The shaft is made to revolve by means of another shaft fixed lengthwise of the car, and is provided with a small pinion to turn the crown wheel. At both ends of the longitudinal shaft there are clutches, providing that the brakes of a train can be coupled and operated together. Both ends of the longitudinal shaft are square, with a spiral twist, and have shoulders, between which and the clutches are spiral springs employed to press outward on the clutches. In coupling cars, should it be the case that the clutches are not exactly in the right position, they will slide back on the shaft with a turning motion caused by the spiral twist at the end of the shaft, until they will "mesh" together, when the spiral spring immediately presses the clutches forward into the position desired. The longitudinal shaft extends under the platform of the locomotive, where it is in connection with a small stationary engine placed conveniently for the engineer. This engine is intended to

furnish power with which to work the brakes, and is always ready when the locomotive is on duty. A piece of mechanism to register the number of revolutions the shaft has been wound up is placed in the cab of the locomotive, enabling the engineer to reverse said shaft to its former place. The clutches may be made to fit different-sized cars by the adoption of a proper standard from the track; and the clutches are said to operate perfectly on sharp curves.

Alfred A. Lambrigger, of Big Horn City, Johnson county, Wyoming Territory, is the inventor and patentee of the device described.

Oiler for Loose Pulleys.

THE oiler for loose pulleys invented and patented by W. D. Greaves, Jr., Presque Isle, Maine, is made by him as follows:

He drills into the end of the shaft as far as the middle of the loose pulley bearing, and then drills a smaller hole through the shaft crossing the end of the first. A wick is then inserted in the holes, which dips into an oil cup tapped into the hole at the end of the shaft.

Although it may appear difficult at first to drill so far into the end of the shaft, this is easily accomplished by hanging the shaft where it is going to run, or in any convenient place, and so belting it that it will make one hundred revolutions or thereabouts per minute, and then simply holding a one-quarter inch twist drill against the end of it. In this way a perfectly central hole may be drilled as far as required. A three-sixteenth inch hole is then drilled through the shaft, and the wick drawn through it, after which the "bight" is drawn out through the first hole by the aid of a hooked wire. The pulley is then put on and the oil cup screwed in place.

Railroad Switch Without a Frog.

THE switch without a frog is operated by a swing-rail, pivoted either at the end or in the middle, or hinged at the end by means of fish-bars as ordinarily used in fastening the ends of railroad rails together. This swing-rail is connected with the switch-stand by a simple mechanical means, in such a manner that when the switch is opened or closed the swing-rail is changed from one track to the other and common to both tracks. The new switch is adjusted to heat and cold. The manufacturers have also an invention to keep the ends of the rails from being battered. The switch is adapted to large yards as well as way stations. It is pronounced by railroad men and first-class mechanics to be far superior to anything yet produced, and is said to be marvelous for its many advantages over the old frogs now in use. The combination in its construction of simplicity, safety, durability and cheapness, is unique in excellence.

The West & Baldwin Patent Railroad Switch Company, Clarksville, Missouri, invite an investigation by railroad men, manufacturers and capitalists, and will send photographs and models for examination to responsible parties.

Their switch is covered by two patents and one more now pending. They are desirous of getting it into use immediately, and in order to do so will give the first railroad that takes hold of it the use of their patents for $1.00 per mile; or, in order to get money to introduce it (provided some road does not accept their offer), will sell the undivided one-third for the best bid within the next ninety days.

Gleason's Rotary Engine.

THE rotary engine invented and patented by Albert H. Gleason, Wabash, Indiana, is composed of casing provided with induction and eduction ports, and having cam grooves formed in the inner faces of its end plates, piston composed of plates and disks provided with radial slots; slides working through between the adjacent ends of plates and in line with slots; and arms arranged between the piston and the end plates of the casing, and having their inner ends fitted to and extended through slots and made fast to one of the slides working through between the adjacent ends of plates, near the inner edge of the latter, and having their opposite ends extended outward in radial line with the other slide thus working, and provided on said outer end with lateral stud or extension operating within the cam groove.

This construction, it is claimed, allows the use of a cam groove of much larger diameter than where the stud operating within it is connected in a horizontal line with the stud, a desirable improvement for the reason that the curves in a cam groove of large diameter are less acute than those of a smaller one, with consequent less friction and easier operation. The Gleason rotary engine is, moreover, said to be light-running and almost noiseless.

NINE hundred miles of railways have been constructed in New Brunswick, and are operated by the following lines: New Brunswick Railroad, operating 443 miles. The Grand Southern, connecting St. John and St. Stephen, and in process of construction along the coast of Maine to Bangor, operating at present eighty miles. The Intercolonial (Government) Railroad, operating 345 miles in the Province, and connecting St. John, Moncton, and the north shore of the Province with points in Nova Scotia and the upper Provinces. Other lines are: The Albert Railway, forty-five and a half miles; St. Martin's and Upham, thirty miles; Elgin Branch, twenty-two miles; Chatham Branch, eight miles; Kent Northern, twenty-eight miles; Dalhousie Branch, six miles.

THE Chicago, Parkersburg and Ohio Railway Company took out its charter April 26; privileged capital stock, $3,000,000, divided into shares of $50 each. The incorporators are: Chas. Smith, Dr. Isaac Scott, A. N. Williams, A. B. Beckwith, W. L. Cole, George Loomis, A. B. White, Chas. F. Scott, G. Gibbons, and S. F. Shaw, all well-known business men of Parkersburg, W. Va. It is the desire of the company to push the line through as quickly as possible, and surveys will be made immediately. This is the Chicago and Norfolk connecting link of the great Black Diamond system, and will prove a bonanza to the states of Virginia and West Virginia. The great Kanawha Valley for 210 miles in length, and a territory twenty miles wide, of valuable coal, timber and iron will be tapped, and a fine agricultural field opened to the market. Robert M. Hughes, of Pittsburg, Pa., has been appointed assistant to the president of the company, of the Black Diamond system, which, when complete, will own 655 miles of track in Ohio, Virginia and West Virginia.

GEO. H. HOWARD,

Counsellor in Patent Causes and Solicitor of Patents.

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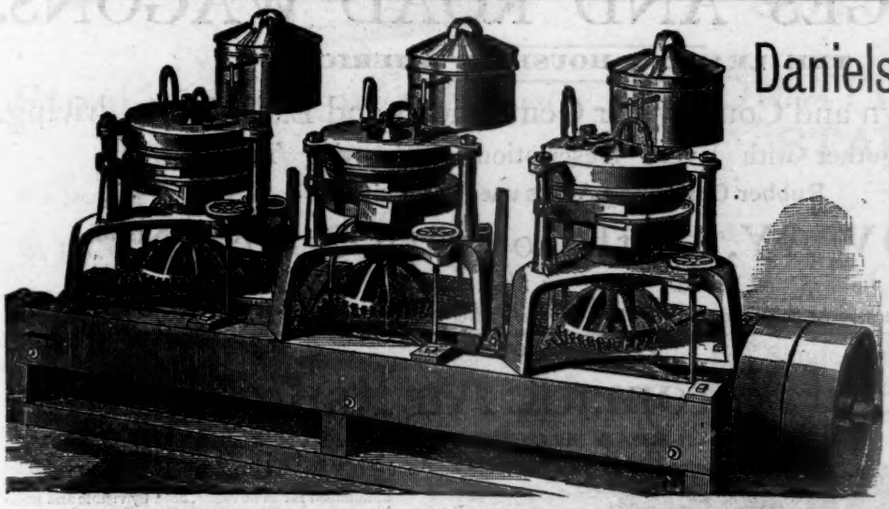

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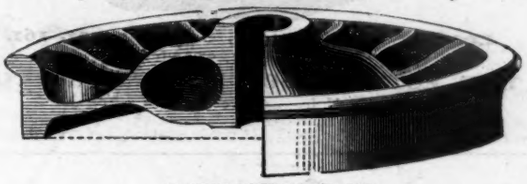

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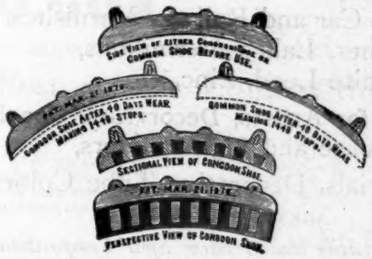

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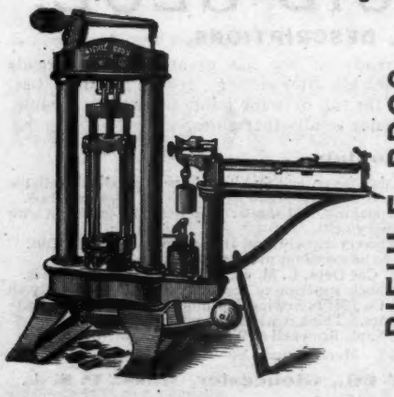

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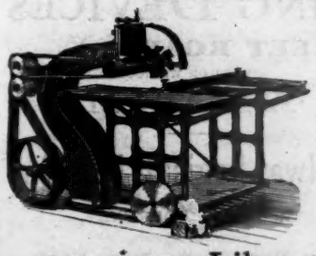
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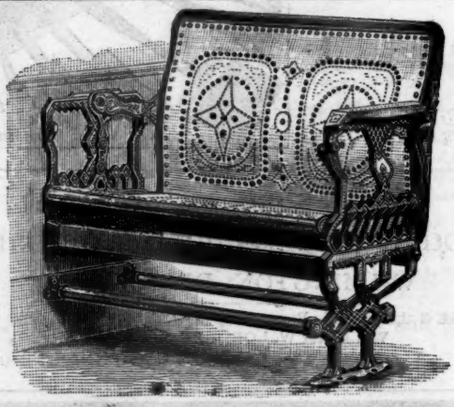

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